Met.O.1003

The Marine Observer

A quarterly journal of Maritime Meteorology

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THE MARINE OBSERVER

A Quarterly Journal of Maritime Meteorology
prepared by the Marine Division of the
Meteorological Office

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VOL. 62 **No. 315** **JANUARY 1992**

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COVER PHOTOGRAPH: Brown Boobies (*Sula leucogaster*) photographed on board m.v. *Rost* on 27 February 1991, in position 06° 30'N, 82° 00'W. A juvenile bird is shown second from the right.

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LONDON: HMSO

Editorial

As the Marine Branch was in the process of shifting ship to a nearby newer berth in Eastern Road towards the end of the year, we received our copy of the Met. Office *Annual Review and Accounts 1990/91*. The retiring Chief Executive, Sir John Houghton, in his foreword to the *Annual Review*, said the move to Executive Agency Status in April 1990 was one of the most important events in the recent history of the Met. Office. It had provided a stimulus for reorganizing our commercial activities, streamlining our operations, and placing greater emphasis on the quality of our services.

Severe weather, in the form of winds and snow, were well forecast through 1990/91 on all occasions, and false alarms were not raised. Forecasts out to 30 days have completed extensive customer trials successfully and many other new services were introduced in response to customer demand. These results have been achieved by exploiting information technology wherever possible, through continued refinement and improvement of our forecasting models and observational data, and through hard work, skill and commitment of our staff, as well as the many voluntary observers on land and sea.

However, we still have to make allowances for the unpredictable. During the year the Gulf war made particular demands on our resources. Staff were redeployed to the Gulf and within the United Kingdom to provide comprehensive services for the armed forces. New high-resolution models for the region proved invaluable in predicting the highly variable weather conditions which occurred there. The continuing effects of the smoke plume from the oil fires in that region are of great concern; the Meteorological Research Flight aircraft provided extensive detailed information on its dispersion and composition.

By its very nature, meteorology is a very international activity. The Met. Office is increasingly involved in co-operation with other countries (particularly those in the European community) in the exchange of data and information, in research and in the development of meteorological services to aviation and to other commercial customers. Sir John Houghton ends his foreword by voicing as our objective that the whole community should benefit from this closer co-operation.

In his Review in the *Annual Report*, the Chief Executive recounts that we exceeded our commercial revenue targets. Income for commercial services totalled £13.1M, up 17 per cent from the previous year. This success is particularly encouraging against the background of the depressed business climate during the year, and bodes well for the future. An increased emphasis is being placed on commercial work under a newly appointed Director of Commercial Services recruited from the private sector.

This commercial success contributed to a fall in net operating costs of 4 per cent when compared with budget. During the year Bracknell was confirmed as one of two World Area Forecast Centres, and given increased responsibilities in serving civil aviation. New initiatives were taken to improve the quality of service delivered to this sector and to reduce costs through automation.

Another section of the review reminds us that shipping forecasts and gale warnings are a long-established part of the Public Meteorological Service. The Safety of Life at Sea convention lays down clear obligations on the United

Kingdom as one of the contracting governments. There is close collaboration with the shipping community and ships provide a valuable source of observations for meteorology.

Under the heading of Commercial Services, there is a report that the speed and efficiency of broadcast fax has become instrumental in the distribution of severe weather warnings to local authorities, shipping and ferry operators, and potentially every customer and client. The Press is already well served by charts transmitted by fax, and during the year we have progressed further towards electronic transmission of ready page make-up to newspapers.

We also shifted into higher gear with our public TV services. International Weather Productions (IWP) — the Met. Office unit providing services for commercial television and now located in WTN's purpose-built integrated unit at The Interchange at Camden — is able to provide almost any level of service for franchisees, from training of staff, through provision of graphics or data, to complete productions. IWP's international operations are now expanding. Already, data are supplied to CNN, the U.S. news channel, and pilot services have been requested by a growing number of overseas channels.

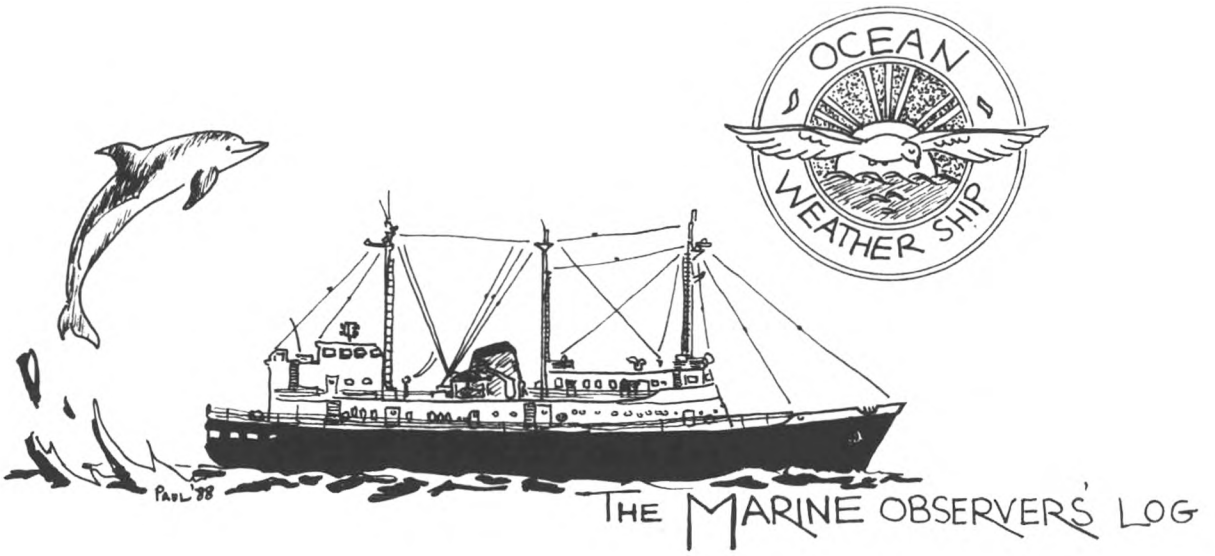
Our BBC team is also preparing to move into new studio facilities at BBC TV Centre, White City. From there, a new business unit will handle all BBC TV and national radio weather broadcasting. [Operations actually commenced last October]. The BBC unit is also expanding its international business with the launch in April 1991 of international weather services for the new BBC World Service Television network.

On the all-important subject of Observations, it was reported that for dedicated national use the Met. Office maintained nearly 300 synoptic stations over and around the British Isles. About 60 are fully automated and a further 150 are manned by auxiliary observers (coastguards, oil-rig personnel, etc.) whose efforts in producing current weather information are greatly appreciated. At the 80 officially manned stations a five-year programme of automation is in hand to minimize the human effort needed while maintaining or improving, as necessary, the synoptic network.

The Office gratefully acknowledges the crews of over 500 U.K. recruited ships and rigs that continued to form part of the 7000-strong international voluntary observing fleet of 49 countries. Another very important contribution to observing over the oceans is the Met. Office weather ship that patrols to the west of the British Isles. Observational gaps over the sea are filled by moored and drifting buoys as part of international programmes.

On that pleasing note, it only remains for us to add our own personal vote of thanks to all our co-operating marine observers, wherever they may be serving, and to wish them seasonable greetings for 1992.

J.F.T.H.



January, February, March

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

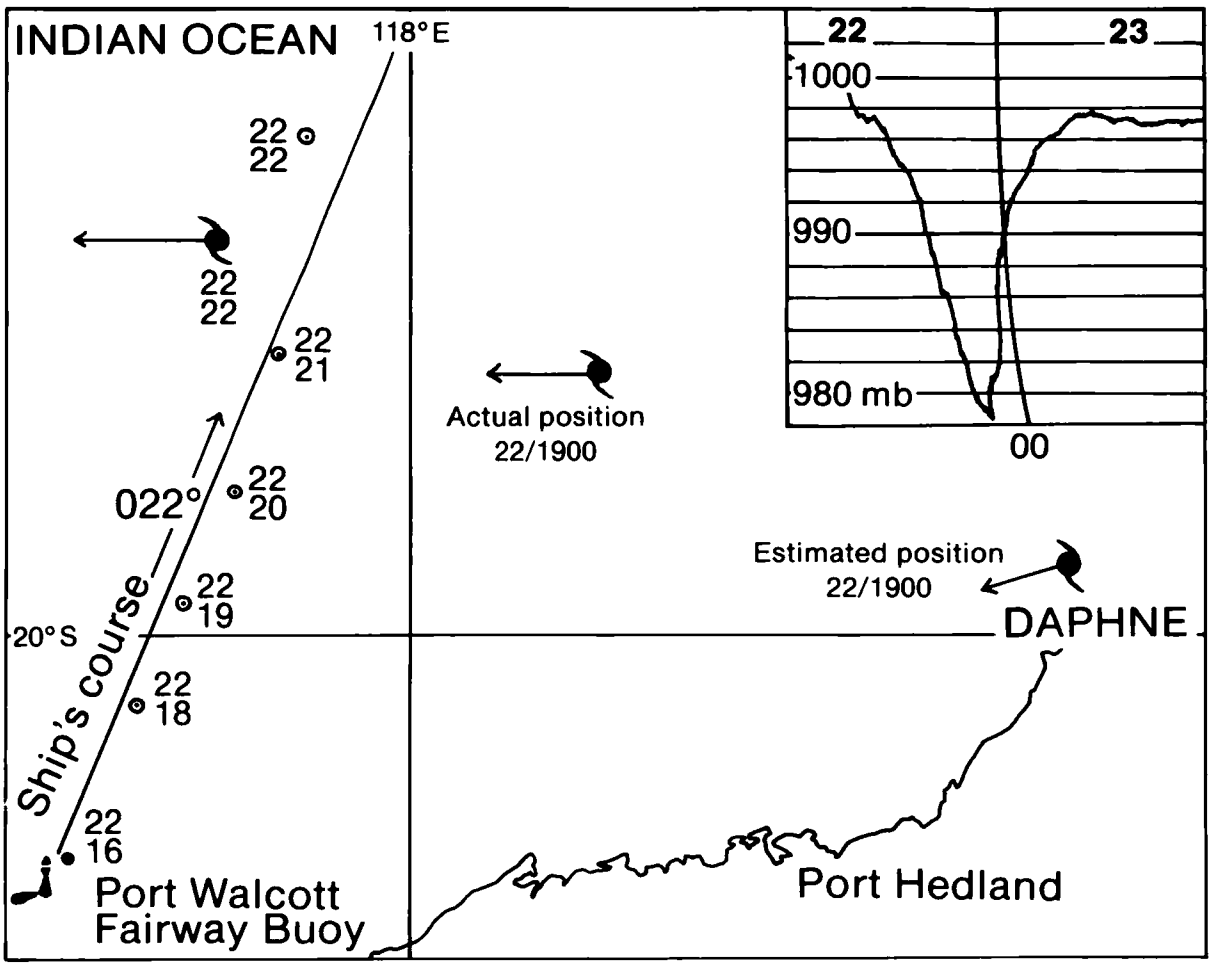
TROPICAL CYCLONE 'DAPHNE'

Indian Ocean

m.v. *Ormond*. Captain N.J. Adams. Kakogawa to Port Walcott. Observers: the Master, Mr R.J.P. Knowles, Chief Officer, Mr D. Kapoor, 2nd Officer, Mr R.K. Verma, 3rd Officer and ship's company.

22–23 February 1991. At 1335 UTC the ship was required to leave the Cape Lambert ore wharf owing to the possible approach of cyclone Daphne which had developed from a low-pressure system in the wake of cyclone Chris. The following observations are extracts from the ship's deck logbook, while the chart and barograph trace show additional details.

Date and time (UTC)	Wind Dir'n	Force	Pressure (mb)	Remarks
22nd 1600	W	5	1002.5	Ship cleared Fairway Buoy. Daphne in estimated position 19.7° S, 120.3° E (at 1300), moving west-south-west at 12.5 knots. Ship's heading 020° at 8 knots.
1800	S×E	7	999.6	Ship 19 n.mile from Fairway Buoy; speed increased to full-ahead as pressure appears to steady.
2000	S	9	994.9	Pressure falling rapidly, storm appears to be closer than indicated in previous reports.
2100	S	10/11	987.9	Pressure still falling sharply.
2200	WSW	8	981.4	Pressure still falling.



At 2230 the minimum pressure was reached and the wind veered. The storm's estimated position at 1900 was 19.6° S, 118.3° E which confirmed that the original estimate of position was suspect. By midnight the pressure was rising quickly and an updated position of the storm for 1900 (received at 2200 on the 22nd) was given as 19.4° S, 117.7° E; this showed that the ship had passed just to the north of the eye of Daphne. The weather improved rapidly from 0200 on the 23rd and at 1230 the ship returned to anchorage at Port Walcott.

Position of ship: approximately 20° 00′S, 118° 00′E.

SEVERE DEPRESSION

North Atlantic Ocean

m.v. *Edinburgh Fruid.* Captain H.G. Gray. Mongstad to Saint John, N.B. Observers: the Master, Mr A.K. Bhoria, 2nd Officer and ship's compnay.

11–13 January 1991. Having departed Mongstad on the 6th the ship found deteriorating weather conditions on the 11th when the pressure started to fall sharply from 1017.1 mb at 0001 UTC to 972 mb at 1600. The wind during this period was E'ly veering SSE'ly, force 9–10 and heavy swell waves of 5–6 m were encountered; the ship's speed was drastically reduced from 14 knots to 8 knots. Thereafter, the pressure continued to fall but at a slower rate, and at 0830 on the 12th was 965 mb while the swell was still about 5 m in height. At this time the

wind suddenly dropped to light airs and the sea became calm although the heavy swell remained. After a tortuous experience with rough weather the calm was a welcome surprise, but it lasted for only about two hours after which the pressure started to rise again and the wind speed picked up once more, reaching force 10 at 1800 on the 12th.

The pressure continued to rise sharply until 1030 on the 13th when it was 1011.5 mb. So, what seemed to be calm was actually the eye of the storm through which the ship had passed.

During the same storm a bulk carrier of about 70,000 tonnes dwt sank off Newfoundland; assistance was given to the Canadian Coast Guard with SAR operations on 14 January, but no survivors were found, only three containers and some wooden planks floating.

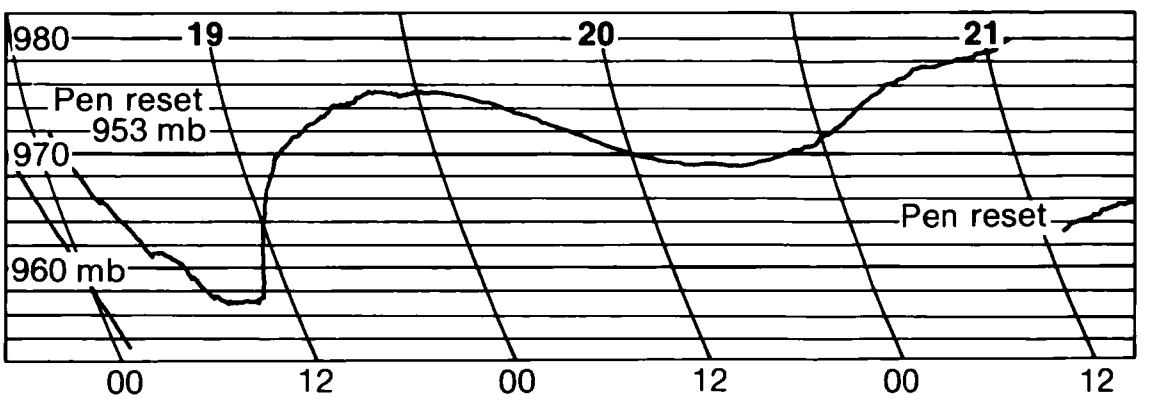
Position of ship at 0001 UTC on the 11th: 51° 58′N, 37° 15′W.

Southern Ocean

m.v. *ACT 7*. Captain A.J. Chivers. Auckland to Lisbon. Observers: the Master and ship's company.

18–20 February 1991. Between these dates a severe depression was encountered during which the pressure was seen to fall from 996.4 mb at 0600 UTC on the 18th to 939.2 mb at 0830 on the 19th. The following observations and barograph trace illustrate the conditions experienced.

Date and time (UTC)		Wind Dir'n	Force	Dry bulb (°C)	Pressure (mb)	Remarks
19th	0100	NE×E	4/5		957.0	Wind backing. Rain. Barograph reset at 0118.
	0300	NNW	9		948.0	Visibility moderate.
	0600	W×N	12	6.0	943.2	Visibility poor. Pressure steadying. Brief breaks in cloud cover.
	0830	WNW	11	6.8	937.0	Minimum pressure reached.
	0900	WNW	10/11		939.5	Pressure beginning to rise.
	1200	WNW	11	8.0	944.7	Poor visibility. Wind beginning to ease.
	1530	SW	7	7.5	953.6	
	1830	SW×S	10		956.3	Visibility decreases to poor.
20th	0030	WSW	12	5.5	957.9	Pressure rising briefly. Poor visibility.
	0230	SW	11/12	6.1	957.8	Poor visibility.



By 0330 on the 20th the winds had backed to SW'ly and were easing, eventually becoming force 5 with visibility improving all the time. The minimum pressure for this day was 951.2 mb occurring at 1800, and at 1305 on the 21st the barograph was reset to normal; although the wind was a constant N'ly, force 6–7, the pressure continued to rise slowly. It was observed from the facsimile maps that the ship had tracked parallel to a very deep depression although some ambiguities existed between the ship's recorded pressure and that shown on the maps. All barometers and the barograph were checked for possible error but none was found.

Position of ship at 0830 UTC on the 19th: 53° 35'S, 138° 35'W.

MANATEES AND FISH

Gulf of Mexico

m.v. *Lincolnshire*. Captain M.M. Reeves. Alongside, Port Sutton, Tampa. Observers: Mr D. Cramer, 2nd Officer, Mr R.W. Ellis, Extra 2nd Officer and Mr A.P. Carter, Cargo Engineer.

16 March 1991. The ship was berthed for discharging a part cargo of ammonia; behind the berth was a large power station which discharged its cooling water directly into the cut, resulting in a higher water temperature and good aeration which gave rise to a large section of the food chain living in quite a small area. There were prolific numbers of catfish ranging in weight from 1–3 kg and caught on almost any bait, also small fry in their hundreds of thousands which, in turn, attracted tuna and tarpon. Reports were heard of tuna up to 25 kg and one of the observers saw fish of up to 20 kg being caught. In addition, numerous mullet were being herded and eaten by the large tuna.

Whilst the observers were fishing from a barge and trying to attract smaller tuna, a manatee of about 2 m in length surfaced at their feet. It had the head, front flippers and main body of a seal but was identifiable by its spade-shaped tail and was light-tan in colour with rust-coloured blotches. Two other manatees were seen at a distance and were estimated to be 4.5 m long and grey in colour. Later on, two more each of about 3 m long were observed playing about 1 m off the bow. One had a very long scar along the ridge of its back, starting roughly 60 cm from its head and tapering off towards the tail. The worst part of the scar was along the centre of the back and must once have been a deep wound inflicted by the propellor of a passing pleasure craft as the manatee was about to dive, the other manatee seemed unharmed. Photographs of the first manatee appear on page 29.

According to the locals the manatees though scarce, were not too timid and would tolerate humans swimming with them and touching them. It appeared that this inquisitive quality could be leading to their demise as two of the five seen were scarred, probably by propellors of the prolific amount of pleasure craft in the Tampa Bay area. It is believed that the manatee is responsible for mermaid sightings in folklore.

Position of ship: approximately 27° 57'N, 82° 28'W.

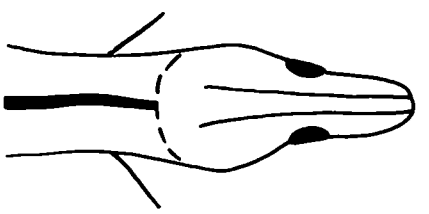
FISH

Indian Ocean

m.v. *Flinders Bay*. Captain D.A. Dornom. Cape Town to Fremantle. Observers: Mr K.S. Hardy, Chief Officer and Mr P.A. Trafford, 2nd Officer.

11 March 1991. A fish, the head of which is shown in the sketch, was found on the foredeck and was assumed to have been there for a few days. No adverse weather had been experienced which could have caused the fish to be washed on board and so the observers' opinion was that it had been dropped by a bird.

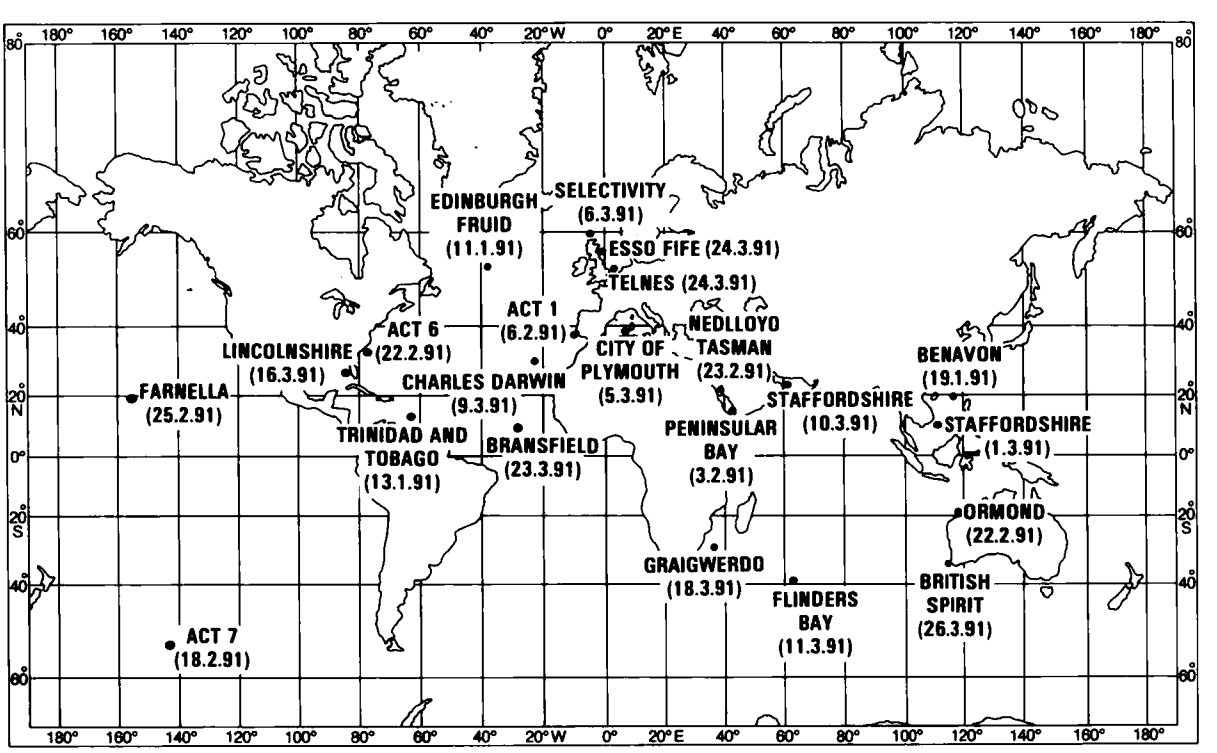
Allowing for the fact that the body would have shrivelled as it dried, the length was approximately 35 cm while the head was 12 mm across at its widest part and the body about 20 mm deep just behind the head. There was a fin on either side just behind the head with a set of gills behind and below each one.



Plan view of head

Obviously, the colour had faded in the sunlight but the upper portion of the body remained dark-brown with a darker stripe following the dorsal ridge to the tip of the tail; the lower half of the body was transparent but close to a gold colour. The head was very similar in shape to a snake's head and the mouth contained a large number of very small teeth while the eyes were large for the size of the head and suggested that the fish came from quite a depth.

Position of ship: 40° 00′S, 62° 48′E.



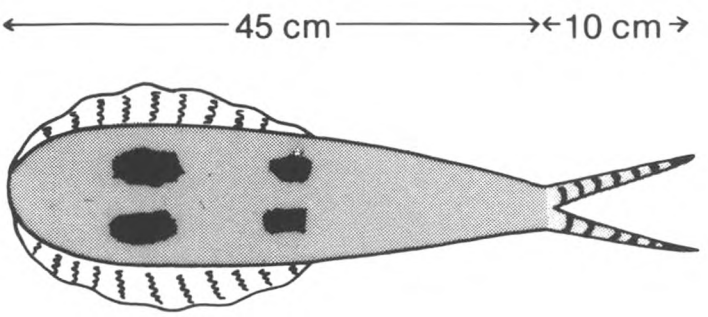
Position of ships whose reports appear in the *Marine Observers' Log*

CUTTLEFISH

Red Sea

m.v. *Nedlloyd Tasman.* Captain S.D. Smith. At Jeddah. Observer: Mr N.D.L. Gregory, 3rd Officer.

23 February 1991. Whilst berthing at the container terminal an unusual form of marine life was observed. Thought at first to be a fish, it quickly became apparent that this was not so as the creature came closer. Some 50–60 cm in length, it was broad at the head, about 10 cm across, tapering to about 5 cm across at the tail where the body split into two spikes, as viewed from above, see sketch. These spikes appeared to be round in cross-section, about 10 cm long and were yellow in colour, tipped with brown.



The body was slightly translucent and seemed to be firm, rather like that of some bell jellyfish. Pinkish-purple in colour, it had a number of symmetrical brown patches along its length. At the head end of the creature was a frill on each side, this undulated and gave what appeared to be the only source of propulsion; the remainder of the body and tail were held still as the creature moved through the water.

Position of ship: approximately 21° 28′N, 39° 11′E.

Note. Dr F. Evans, of the Dove Marine Laboratory, University of Newcastle upon Tyne, comments:

'I have little doubt that this was a cuttlefish and that what was thought to be the head end was, in fact, the rear end. The animal, to add to the deception, was swimming backwards which they often do. Cuttlefish have a body surrounded by a frill or undulating membrane which they use for slow swimmimg. At the true head end is a cluster of eight short tentacles held for the most part in a cone. Additionally there are two long tentacles which may be held extended, as in the illustration, but are usually retracted. It is these two tentacles which can be moved rapidly and which have a pad of suckers at their tips to catch prey. I may add that the creatures have good eyes, possibly represented by two of the blotches on the drawing, and they can alter their colour very rapidly.'

SQUID

Eastern North Atlantic

R.R.S. *Charles Darwin.* Captain M.A. Harding. Hove to taking core samples. Observers: Mr P.A. Burridge, 3rd Officer, Mr G. Poon, Boatswain and scientific staff.

9 March 1991. At 2100 UTC a large squid was seen close alongside; its dimensions were difficult to assess, but it was estimated to be about 1.2 m long, excluding tentacles which were not readily apparent from the bridge wing. The

beast was last seen in the vicinity of the 3.5 kHz fish at starboard aft (not transmitting) in which it showed some interest. From the bridge wing the animal appeared light in colour although this could have been a result of the ship's working lights being reflected back. A further report upon the squid from the Boatswain, working on deck, gave its dimensions as follows: body 1.5 m long by 50 cm wide with tentacles of 45 cm. It was mottled brown on its upper surface and white below.

Shortly after the squid was lost to view the personnel on deck reported four 'yellowtails' alongside, ranging in length from 1.2–2.0 m. They swam around in close formation alongside the ship for about 15 minutes before they too departed.

Position of ship: 30° 36′N, 22° 23′W.

Note. Dr F. Evans comments:

'While it is not possible to give a name to this animal, there is a fine account of very large squid in A.C. Hardy's famous book, *The Open Sea: The Worlds of Plankton.* He gives two genera of big squid, known from the Azores-Madeira region. The smaller one, of which the observed creature may be an example, is *Stenoteuthis* while the larger is the true giant squid or kraken, *Architeuthis.* Hardy cites several examples of *Stenoteuthis* with body lengths, excluding tentacles, in excess of 1 m that were stranded on the Yorkshire coast.

'*Architeuthis* can grow much larger than this, although there are endless problems about measuring the true size. This can normally be done only on dry ground, of course, and as squid can be rather elastic some deliberate stretching is forgivable on the part of the proud captors. Moreover, body length excluding tentacles may be only 20–30 per cent of maximum length, so ashore the present example, with a 1.2–1.5 m body length, could be reported as being 6 m long.

'The four yellowtails of 1.2–2.0 m reported at the same time may have been one of several species of this group of fish, also called amberjacks. The species common in this latitude of the Atlantic is *Seriola dumerili* but it tends not to grow more than 1 m in length. *S. lalandi* grows twice as long but is mostly recorded from the tropics and around the South African coast.'

BIRDS

South China Sea

m.v. *Staffordshire.* Captain R.A.F. Edwards. Ulsan to Das Island. Observers: Mr I.D. Handford, 2nd Officer and Mr I.G. Macneil, 3rd Officer.

1 March 1991. At 0350 UTC two birds, as shown in the sketch, were seen for two minutes chasing each other round the mast risers and samson posts of the ship, possibly in some courtship act after which they flew off together in a north-easterly direction.

With reference to *A Field Guide to the Seabirds of Britain and the World*, by Gerald Tuck and Herman Heinzel, the only bird of any similarity was the Wedge-tailed Shearwater (*Puffinus pacificus*). However, the observed birds were a shiny, silky-black colour with several dotted white and purple spots towards the wing-tips and they had black undersides. The bill was more pointed and there were short tail streamers about 12 cm long. On the whole, they were similar in body to the shearwater but were far more elegant birds. Both birds were approximately 36–41 cm long but the wing-span was not possible to estimate owing to the nature of the birds' flight at the time.

Weather conditions were: dry bulb 27.4 °C, pressure 1015.4 mb, wind ESE'ly, force 3–4.

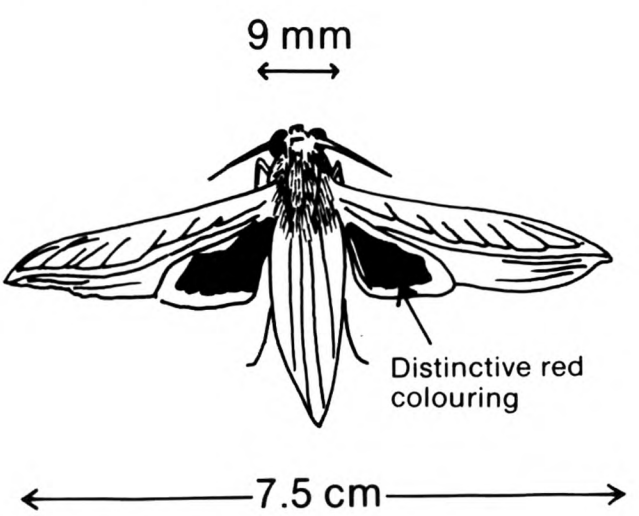
Position of ship: 09° 14′N, 110° 12′E.

INSECTS

Red Sea

m.v. *Peninsular Bay*. Captain J.H. Hutson. Hong Kong to Suez. Observers: Mr R.A. Kenchington, Chief Officer, Mr B.G. Ball, 3rd Officer, Mr R. Halewood, Petty Officer and Mr C. Carr, SMS.

3 February 1991. At 1630 UTC the moth shown in the sketch caused much consternation to the officers on watch at the time, by its haphazard low-level flying inside a darkened wheel-house.



Upon capture it was found to measure 42 mm long and 9 mm wide with a wing-span of 75 mm and the greater part of the thorax was covered in soft, fur-like hair which came away very easily when touched. The predominant colouring consisted of variations on the colour brown but with a tendency to being darker on top and lighter beneath. On the upper wings the colouring was predominantly brown/black although the underwings had a very distinctive red colouration on the lower edge.

The dry bulb was 25.0 °C, the wind SSE'ly, force 3–4 and the skies were clear although the night was particularly dark as the moon had not yet risen.

Position of ship: 15° 09′N, 41° 54′E.

Note. Mr G.R. Else, of the Natural History Museum, comments:

'The moth is a Silver-striped Hawkmoth (*Hippotion celerio*) (Lepidoptera, Sphingidae). This species has an enormous range in the Old World tropics and sub-tropics: from southern Spain to Fiji and South Africa to Japan. It occurs in the British Isles as a very rare migrant, probably from Africa. The larva feeds on vines and bedstraws.'

BIOLUMINESCENCE

South China Sea

m.v. *Benavon.* Captain P.C. Thompson. Kaohsiung to Singapore. Observers: Mr R.G.C. Noble, 2nd Officer and Mr M. MacIntyre, SG1A.

19 January 1991. At 1830 UTC bioluminescence was observed taking the form of frequent independent white flashes, all of which appeared in the disturbed water of the bow wave, ship's wake and to a distance of about 10 m from the side of the hull. The flashes lasted for varying lengths of time; some were instantaneous while others persisted for 3–4 seconds before disappearing. Some of them were a bright, clear white light indicating that they were probably on the surface, while others produced a diffused white light of varying intensities which looked as if they were produced beneath the surface. Their frequency also varied continuously throughout the observation, from single ones to about 30 being visible at any one time. To give an indication of the overall effect, the phenomenon reminded the observers of old wartime film taken from aircraft during night-time bombing raids. A sample of water was collected by sea bucket, and an attempt made to produce these flashes by shaking the sample in a glass bottle, but there was no reaction.

At the same time as the above form of bioluminescence, there seemed to be a second type but it was difficult to pinpoint the source. The effect was that the atmosphere around the ship and extending to the horizon had some form of faint white illumination not provided by the light in the water, which was black apart from the previously described flashes. On the other hand, there was no obvious source in the sky either, which although virtually cloudless was very dark, and certainly darker than the atmosphere at the level of the ship.

The only conclusion that the observers could come to was that this was a faint example of (to quote *The Marine Observer's Handbook*), 'luminescence in the air a few feet above the sea surface when there is no light in the water'. This form only lasted for about 30 minutes before fading away completely, whereas the bright flashes continued for three or four hours before they too eventually ceased.

The ship's speed was 22 knots, and weather conditions were: air temperature 22.9 °C, wet bulb 21.7°, sea 24.0°, pressure 1015.3 mb, wind ENE'ly, force 4.

Position of ship: 18° 49'N, 116° 06'E.

Note. Dr P.J. Herring, of the Institute of Oceanographic Sciences, Deacon Laboratory, comments:

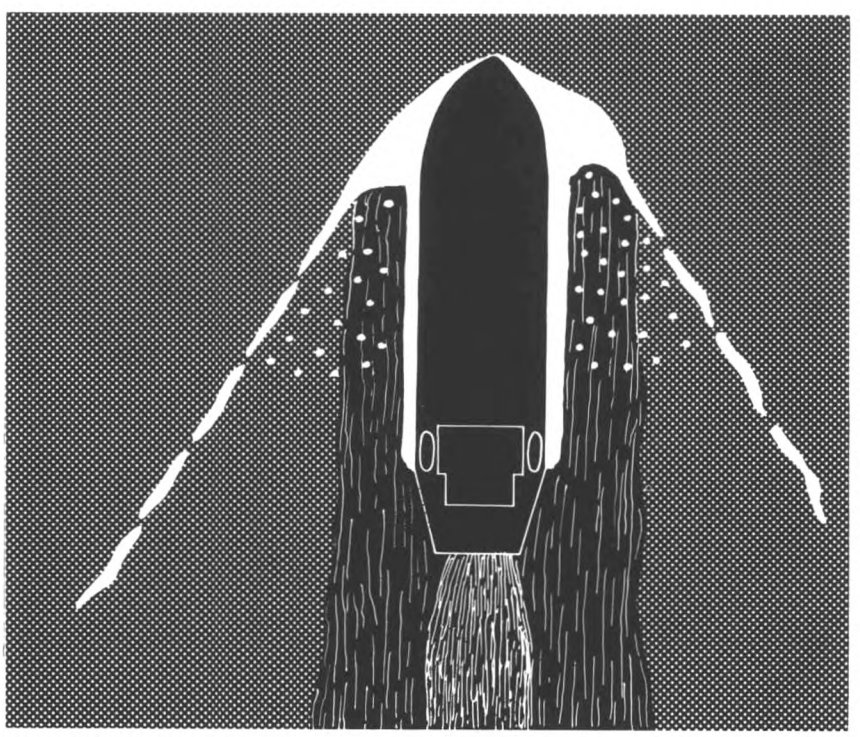
'The description of the bright flashes certainly evokes the images seen on films of bombing raids, and fits the appearance of luminescing jellyfish at different depths.

'The aerial luminescence is much more puzzling, and I can do no better than the handbook. It has been suggested that this is caused by luminescent micro-organisms being carried up in a sea mist from the surface, but there has never been any hard evidence for this, particularly (as here) when the water itself is not obviously luminescent.'

Gulf of Oman

m.v. *Staffordshire*. Captain R.A.F. Edwards. Ulsan to Das Island. Observers: Mr I.D. Handford, 2nd Officer, Mr I.G. Macneil, 3rd Officer, Mr R. Panes, AB and Mr M. Eduarte, AB.

10 March 1991. At 1750 UTC the first of two spectacular displays of bioluminescence was seen. As the synoptic observation was being compiled, the wake of the ship was noted to have a long, bright, luminous glow along its crest, there was also an area about 10 m^2 on either bow which was just a large glow illuminating the forward end of the ship while a band of luminescence about 2 m wide down either side of the hull illuminated the boot topping, see first sketch. The areas affected would flare up brightly for about two minutes and then ease to homely glow for about three minutes before flaring again.



The colour of the luminous area was a mixture of a bright luminous yellow and emerald-green of a magnitude similar to that of Venus (−4.0) earlier in the evening and was a truly spectacular sight on a dark and hazy night.

The phenomenon ceased at 1820 by which time four samples of water had been taken; upon being shaken up, the lights flashed again and also did so when the water was spilt on the deck, but otherwise there was no trace of any particles. The echo-sounder and the Aldis lamp were switched on and off to see if there would be some effect but no change was noticed.

At 2020 the ship passed through another area of bioluminescence of high intensity and which illuminated the whole accommodation and superstructure, see second sketch . The difference this time was that it covered a larger area and the air reeked heavily of oily fish.

During this period the wind freshened and disturbed the sea surface causing brighter activity which drastically impaired night-vision. For as far as the eye

could see through binoculars it was luminous, the effect could only be described as looking at a whole galaxy of bright stars against a luminous, milky background.

The phenomenon lasted for 20 minutes during which time three samples of water were taken; one was spilt on the bridge wing area and about 250 bright specks of about 2 mm in diameter were counted. Even the sample that had been left from the sighting of 1820 was again glowing with small specks.

Throughout the entire period the ship's speed was 17.5 knots whilst the sea-water temperature was 24.3 °C at the first sighting and 23.2° at the second.

Position of ship at 1820 UTC: 22° 41′N, 60° 31′E.

Note. Dr P.J. Herring comments:

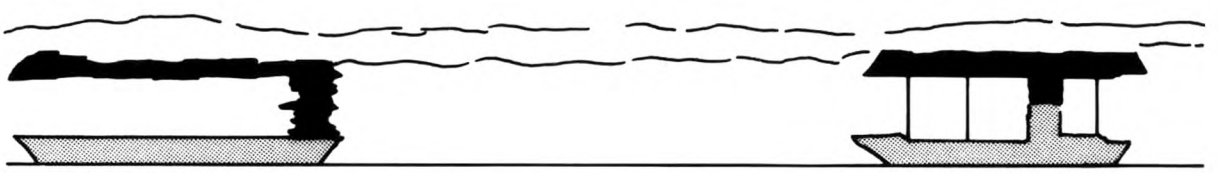
'These reports, with their helpful diagrams, are consistent with the vessel encountering an area of very dense concentrations (a "bloom") of luminous dinoflagellates. These organisms are generally microscopic but some reach to 1 mm or so in diameter. These larger ones are positively buoyant and will accumulate on the surface in calm conditions. The luminous points in the water samples are very characteristic of these conditions. The organisms are easily stimulated mechanically, and fatigued, but recover their responsiveness if left undisturbed for a period. This may account for the change in the responses of the 1820 sample. The freshening wind would increase the luminescence of those right on the surface, as the observers described. A fishy smell is often reported with these blooms.'

ABNORMAL REFRACTION

Mediterranean Sea

m.v. *City of Plymouth*. Captain S.H. Duckworth. Ashdod to Dublin. Observers: the Master and Mrs K. Molloy, 2nd Officer.

5 March 1991. At 1630 UTC while on a course of 264° at a speed of 13.5 knots superior mirages of two ships 16 n.mile to the south of the vessel were observed, see sketch. The inverted images of the ships were very well defined and almost touched the actual ships which were on a course of 084° at a speed of 14.0 knots. The horizon could be seen and a couple of degrees above that was a thin line of cloud which was considered to be stratocumulus. With the aid of binoculars the effects shown in the sketch were visible, the inverted images being on the cloud layer. It was determined that this was a result of super refraction thought to have



occurred because of warm air blowing offshore over a cooler sea together with light winds and slight sea conditions. One of the ships was a general cargo ship and its masts and derricks were very clearly visible in the image and were better defined than those on the actual ship.

The sky was almost completely covered by additional dense cirrus and thick altostratus with well-defined lenticular cloud also present, the cloud had been developing over the previous three hours. Weather conditions at the ship were: dry bulb 17.0 °C, sea 15.0°, pressure 1017.0 mb, wind SE'ly, force 2. The sea was slight with a low swell from the south-east.

Position of ship: 37° 35′N, 08° 30′E.

Note. Dr R. White, of the Institute for Research in Meteorological Optics, comments:

'The apparent stratocumulus cloud is most likely to have been a fuzzy image of part of the sea surface, such as can be observed when ducted rays are able to intersect the sea surface. The presence of just a single additional image is most probably due, in this case, to the thermocline being fairly sharp.'

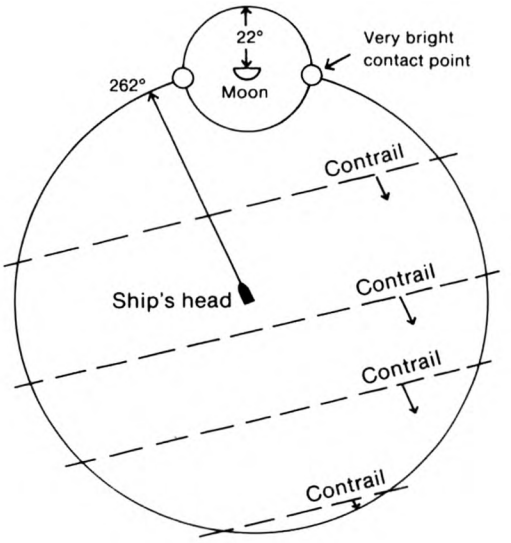
HALO

Western North Atlantic

m.v. *ACT 6*. Captain B.W. Nuttall. Norfolk, VA. to Charleston. Observers: Mr J.M. Reid, 3rd Officer and Mr C. Billingham, Watchkeeper.

22 February 1991. At 0300 UTC the half-moon was viewed through very light cirrostratus and a full halo of radius 22° was observed along with four contrails and a secondary feature as shown in the sketch.

The moon at an altitude of 55° above the horizon ahead, appeared to be on the radius of a larger circle although the line of this circle was not visible through or inside the halo; the circle was at an altitude of 50° above the horizon aft and was



visible in full. There were two contact points where the halo crossed the secondary circle and were very bright in appearance. The larger circle disappeared at 0345 and left only the halo.

Weather conditions were: air temperature 19.7 °C, wet bulb 19.0°, wind SW'ly, force 4.

Position of ship: 32° 48′N, 78° 01′W.

Note. Dr R. White comments:

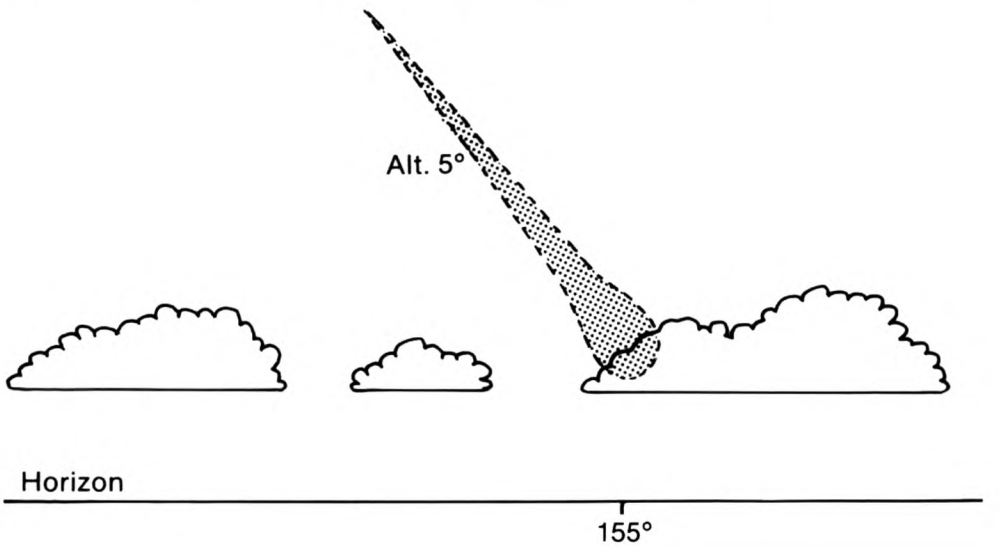
'This is quite clearly an ordinary 22° lunar halo with paraselenae (at its intersection with the parselenic circle) and paraselenic circle. It is not unusual not to see the part of the paraselenic circle that lies within the halo; there are fewer, and generally less bright, ray paths that contribute there.'

METEORITE

Indian Ocean

m.v. *Graigwerdd.* Captain G. Watson-Wood. Boston to Madras. Observer: Mr I.A. Pakula, 3rd Officer.

18 March 1991. At 1950 UTC a very bright meteorite was sighted bearing 155°, see sketch. It was visible from an elevation of 7° down to 2° above the



horizon. The meteorite was a very light-green colour and its brilliance was approximately half that of the full moon.

The total duration of the sighting was probably less than 1 second but a trail remained visible for about another 2 seconds. The angle of descent with the horizon was roughly 60°.

Position of ship: 30° 20'S, 36° 58'E.

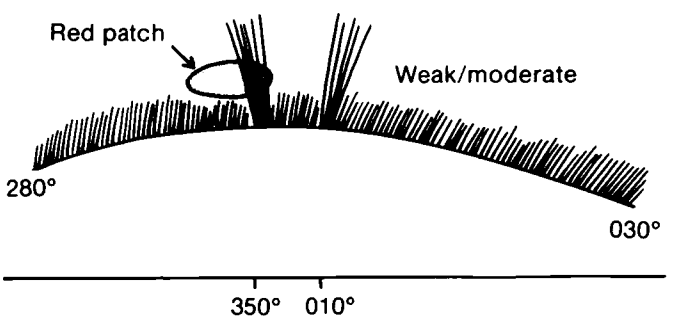
AURORA BOREALIS

North Sea

m.v. *Selectivity*. Drax to Glasgow. Observer: the Master.

6/7 March 1991. Between 2000 and 2340 UTC an auroral display, part of which is shown in the sketch, was seen; the sequence of events was as follows (elevations being estimates only).

Date and time (UTC)	Remarks
6th 2000:	Rayed arc, elevation 10°, bearing 270°–045°; weak/moderate. Quiet.
2010:	Rayed band, elevation 5°, bearing 310°–030°; moderate. Quiet.
2030:	Homogeneous band bearing 280°–030°; weak/moderate. Two moderate rays at 350° and 010°.



2042:	Patches, elevation 1°–2°, extending from 280° to 040°; weak/moderate.
2045:	Homogeneous band, elevation 4°; weak. Quiet.
2050–2052:	Patches, elevations to 30°; weak/moderate. Flaming. Activity gradually decreased from 2100 to become a glow in the northern sky by 2145.
2320:	Homogeneous band, elevation 10°, bearing 280°–040°; weak. Quiet.

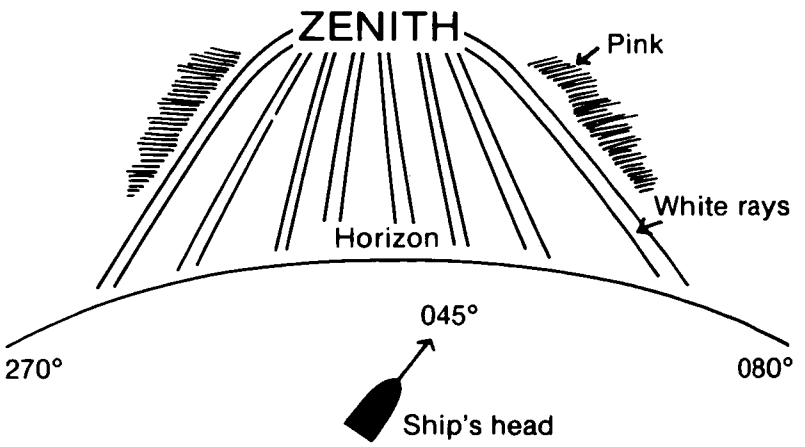
By 2330 the display was reduced to quiet rays of moderate intensity and 10 minutes later was no more than a weak glow.

Position of ship: 56° 25'N, 01° 00'W.

North Sea

m.v. *Esso Fife*. Captain F. Cook. Tees Bay to Fulmar oil field. Observers: the Master, Mr A.G. Pompa, 2nd Officer and ship's company.

24/25 March 1991. Between 2134 and 2143 UTC an auroral display covering an arc from 270°–080° was seen with very bright rays stretching from the horizon to the zenith, as shown in the sketch. There was a very definite pink colour which appeared mostly at the extremes of the display, whereas the rays were white. As



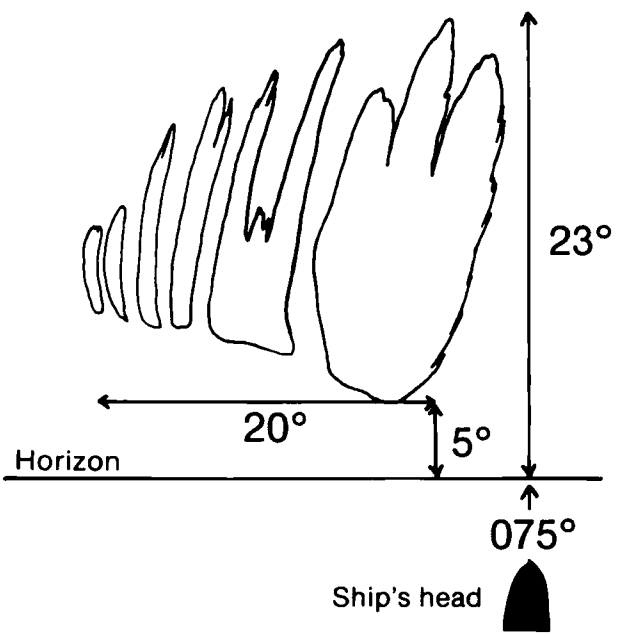
the rays diminished, the pink tinge to the sky remained from 60° altitude to the zenith. The strongest part of the display occurred between 2134 and 2140, it then became less definite with the rays slowly disappearing. Cloud cover was 1 okta of cumulus around the horizon with an otherwise clear sky.

Position of ship: 55° 00'N, 00° 22'W.

North Sea

m.v. *Telnes*. Captain A.M. Smart. Kingsnorth to Amsterdam. Observers: Mr D.J. Ayling, 2nd Officer and Mr D. McNeil, SG1B.

24/25 March 1991. Whilst crossing to Amsterdam on a course of 075°, the aurora shown in the sketch was observed between 0100 and 0120 UTC. A blood-red rayed arc was seen about 10° off the port bow, and varied little throughout the sighting. The estimated base elevation was 5° and the highest part of the arc was at about 23°, its width was roughly 20°.



The formation of the display was not seen but it had faded by 0120. There were clear skies throughout the observation and the wind was NE'ly, force 4.

Position of ship: 52° 21'N, 03° 50'E.

AURORA AUSTRALIS

Indian Ocean

m.v. *British Spirit.* Captain P. Jameson. Singapore to Whangarei. Observers: Mr N.P. Garratt, 3rd Officer and Mr T.R. Stringer, Cadet.

26/27 March 1991. Whilst the ship was proceeding around Cape Leeuwin on a course of 124° and nearly abeam of Point D'Entrecasteaux a strange, reddish-purple ethereal glow was observed in the south-eastern sky between 1324 and 1406 UTC. Bounded by towering cumulus clouds on either side and bearing approximately 145° at an altitude of 40°, the lower section of the glow seemed to be almost white; it intensified at first and then after about 10 minutes it faded to reveal a clear sky.

At 1351 the glow reappeared in roughly the same position as before although this time it was not so intense but lasted until 1406 before fading again. The moon at the time was almost full and on the ship's meridian and the glow persisted even when the moon was obscured by cloud. The glow was not visible in any other breaks in the 6 oktas of cloud cover.

Position of ship: 35° 07'S, 115° 48'E.

SUNSPOTS

Atlantic Ocean

R.R.S. *Bransfield.* Captain J. Cole. Montevideo to Grimsby. Observers: the Master, Mr W.J. Pearn, 2nd Officer, Mr M.E.P. Gloistein, Radio Officer, Mr J. Dodd, SG1 and members of ship's company.

23 March 1991. At 0811 UTC shortly after sunrise, when the sun's altitude was 17° 21′ and it was still in haze, dark marks were visible to the naked eye on its surface. It was possible to use binoculars with shades and the observers could determine that the marks were actually sunspots. As the sun's altitude increased further observation was possible through the sextant.

Whilst this was being observed the Radio Officer was working the amateur radio bands. He reported experiencing selective fading (QSB) and propagational variations on 18 and 24 Mhz between 0750 and 0815. The BBC World Service later in the day advised listeners of likely interference owing to sunspot activity.

Weather conditions were: air temperature 23.2 °C, wet bulb 20.4°, sea 24.2°, wind NE'ly, force 4, visibility 3.5 n.mile owing to haze.

Position of ship: 09° 31'N, 28° 36'W.

SATELLITE

Eastern North Atlantic

s.s. *ACT 1.* Captain D. MacKillop. Barcelona to Fremantle. Observers: Mr M. Speers, 3rd Officer and Mr M. Gibson, Lookout.

6 February 1991. At 2205 UTC whilst the ship was on a course of 234° at 18 knots an extremely bright object was seen to cross the sky at speed having first appeared almost overhead and slightly to the south of the ship. From this

position it crossed the sky on an approximate course of 240°, disappearing at an altitude of about 25°–30° above the horizon and almost directly ahead. All the time there were fragments coming off the object and burning up.

The whole object gave off an extremely bright greenish-white light which was enough to light up the deck and make it possible to read numbers on containers some 21 m away as well as cause disruption of night-vision. The observers concluded that this was most likely some kind of space debris coming out of orbit.

At the time the wind was SW'ly, force 4 and the sky was lightly overcast.

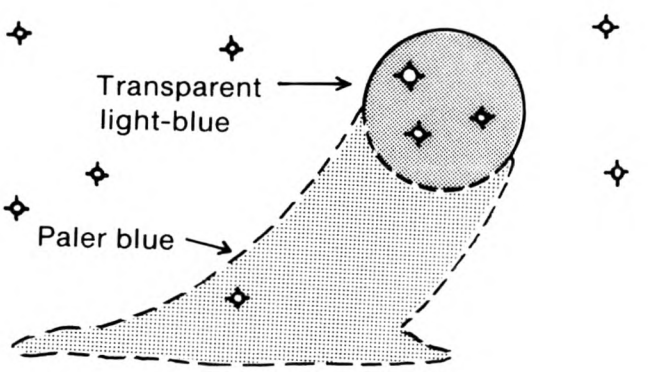
Position of ship: 36° 50′N, 01° 50′W.

UNIDENTIFIED LIGHT

Caribbean Sea

m.v. *Trinidad and Tobago*. Captain M. Knight. Point Lisas to São Sebastião. Observer: Mr K.M. Duncan, 3rd Officer.

13 January 1991. At 0210 UTC whilst the ship was proceeding eastwards along the north coast of Trinidad a relatively bright patch was noticed in the almost cloudless sky and was thought to be a cluster of stars. Its bearing was approximately 300° at an elevation of about 50° and closer inspection through binoculars revealed a rather strange phenomenon, as shown in the sketch.



The bright patch was a perfect circle of a bright, light-blue colour and was transparent as stars could be seen through it. There was also a trail from the circle which looked like the track a disc would describe if moved through an arc. This trail was also of a light-blue colouration but was not nearly so bright as the circle. The entire phenomenon dissipated after about five minutes.

Position of ship: 10° 57′N, 61° 27′W.

LAVA FLOW

North Pacific Ocean

m.v. *Farnella*. Captain J.B. Nicholls. Hawaiian Islands to Palmyra Island. Observers: the Master, Mr F.F. Khun, 2nd Officer and ship's company.

25 February 1991. At about 0001 UTC whilst on passage to the survey location at Palmyra Island the ship was 1.3 n.mile off the coast in the vicinity of Kupapau

Point on the south-east coast of Hawaii and passed an area where a lava flow from the Kilauea crater meets the sea. Volumes of rising steam were visible and a photograph was taken by the Second Officer.

Unfortunately, only the steam could be seen in daylight but three nights previously, the ship passed this point in darkness and the orange glow of the lava was clearly seen at 5–6 n.mile. There was a steady stream of it accompanied by occasional projected lava at various angles.

Position of ship: 19° 18′N, 154° 59′W.

Voluntary Special Observing Programme — North Atlantic

By J.S. Hopkins
(Marine Advisory Service, Bracknell)

Introduction

From the summer of 1988 to the summer of 1990, 45 ships from the international Voluntary Observing Fleets participated in a special exercise, known as VSOP–NA, to study the effects on ship data of differing instrumentation and observing practices. The project was carried out under the auspices of the WMO Commission for Marine Meteorology (CMM), with the support of the World Climate Research Programme (WRCP) and the Committee on Climate Change and the Oceans (CCCO). Vessels from six national fleets, those of Canada, France, Germany, the Netherlands, United Kingdom and United States, were involved, and the project required a high level of preparation and additional effort by national co-ordinators, Port Met. Officers and masters and observers of the participating ships.

The need for augmented observations

There are clear difficulties in siting instruments on board a merchant ship so that they provide measurements which are representative of the 'free' air undisturbed by the presence of the ship itself. Some National Meteorological Services consider that estimates of wind speed, made using the Beaufort scale, are preferable to measured values which are subject to unquantified calibration, exposure and reading errors. Also, the design and siting of thermometer screens varies widely between national services, and some recommend the use of psychrometers rather than screens to increase the likelihood of adequate ventilation. Conventional observations from ships include only very limited information to allow the different observing practices to be identified when the observations are used, and so a major aim of the project was to acquire supplementary information to define the detailed instrumentation and procedures in use by each ship; the effects of these differing methods of data-gathering could then be analysed quantitatively.

Method of analysis

Since co-location of reporting vessels is rare in practice, it was necessary to have a reference against which observations could be compared. Such a reference was provided by the analysis fields produced by an operational numerical weather prediction model. The archive of the U.K. Met. Office limited-area (Fine Mesh) model was used for this purpose, and each VSOP observation was matched against the corresponding archived model analysis value for the same location. Thus differences (observations minus model) could then be summarised by ship, by observing practice and by prevailing conditions. Since the model analyses are subject to certain errors due to the simplifications and assumptions in the model physics, the model values should not necessarily be regarded as 'truth', but this approach does allow ship observations from widely different areas and times to be compared in order to expose relative differences arising from differing instrumentation and observing practices.

Selection of observing vessels

The identification and recruitment of suitable ships was the first phase of the project; an initial selection was made on the basis of reporting performance of ships regularly plying the North Atlantic, and actual recruitment and instruction was undertaken by Port Met. Officers. Since additional information on instrumentation and observing practice was crucial to the success of the project, every effort was made to obtain detailed and complete descriptions of the vessels, their instrument types and exposures. It is intended that this information be published in summarised form by WMO to demonstrate clearly to data users the wide variety of vessel types making up the international VOF, and the differences in instrument type and exposure which occur.

The first VSOP observations were made (by Dutch vessels) in May 1988, but most German and U.K. ships began in September of that year, and U.S.A. and French ships in the early months of 1989. A list of participating vessels is given in Table 1. Sadly, the sole Canadian participant, *Irving Forest*, was lost at sea in January 1990; fortunately all hands were rescued by a passing vessel.

Table 1 — List of vessels participating in VSOP–NA

CANADA:	
Irving Forest	VSBG8
Ariana	DIDA
C.R. Libreville	FNCZ
Atlantic Cartier	FNEF
Edouard L.D.	FNFD
La Carabie	FNGM
La Lafayette	FNGS
Jean Charcot	FNOY
GERMANY:	
Independent Endeavor	DDLN
Euro Texas	DDUC
Nurnberg Atlantic	DHNE
Alemania Express	DHRG
America Express	DIMC
Independent Concept	DNBR
Independent Pursuit	DNJR
NETHERLANDS:	
AEL America	PCEL
Gulf Speed	PELT
Gulf Spirit	PELU
Nedlloyd Kingston	PGDG
Nedlloyd Kyoto	PGDS
Nedlloyd Zeelandia	PGDW
Nedlloyd Neerlandia	PGEG
UNITED KINGDOM:	
Atlantic Link	C6DS
Author	GBSA
Geestbay	GBVV
Geestport	GBVW
Geestcape	GJMR
Geesthaven	GJMS
CGM Provence	GXES
Atlantic Conveyor	GZMM
Nickerie	VRAZ
Canmar Ambassador	VSBV3
UNITED STATES OF AMERICA:	
Julius Hammer	KRGJ
Margaret Lykes	KRJL
Sheldon Lykes	KRJP
Sealand Atlantic	KRLZ
Sealand Commitment	KRPB
Delaware Bay	WMLG
Adabelle Lykes	WPFZ
Charlotte Lykes	WPHZ
Galveston Bay	WPVF
Nedlloyd Hudson	WPWH
Lyra Lykes	WSDG
* *Mercandian Sun*	OXTZ2
* *Mercandian Continent*	OXGK2

Note. Vessels marked * operated in areas outside the model domain during VSOP, and so unfortunately their data could not be used in the analysis. These vessels therefore do not appear in Figure 2.

Data Processing

VSOP log sheets were collected by each responsible National Meteorological Service and forwarded to the Deutscher Wetterdienst in Hamburg, where the data were transcribed to magnetic tape. These tapes were then despatched to the archiving centre at the Met. Office, Bracknell. The total number of observations archived was 33,600, with 28 of the 45 participating vessels achieving at least a full annual cycle of observations. Two vessels, *Nedlloyd Neerlandia* and *Geestbay*, submitted data over a full 2-year period. The British vessel submitting the most observations was *Geestcape*; see Figure 1 showing observation counts in each 1-degree square from this ship over the period of the project.

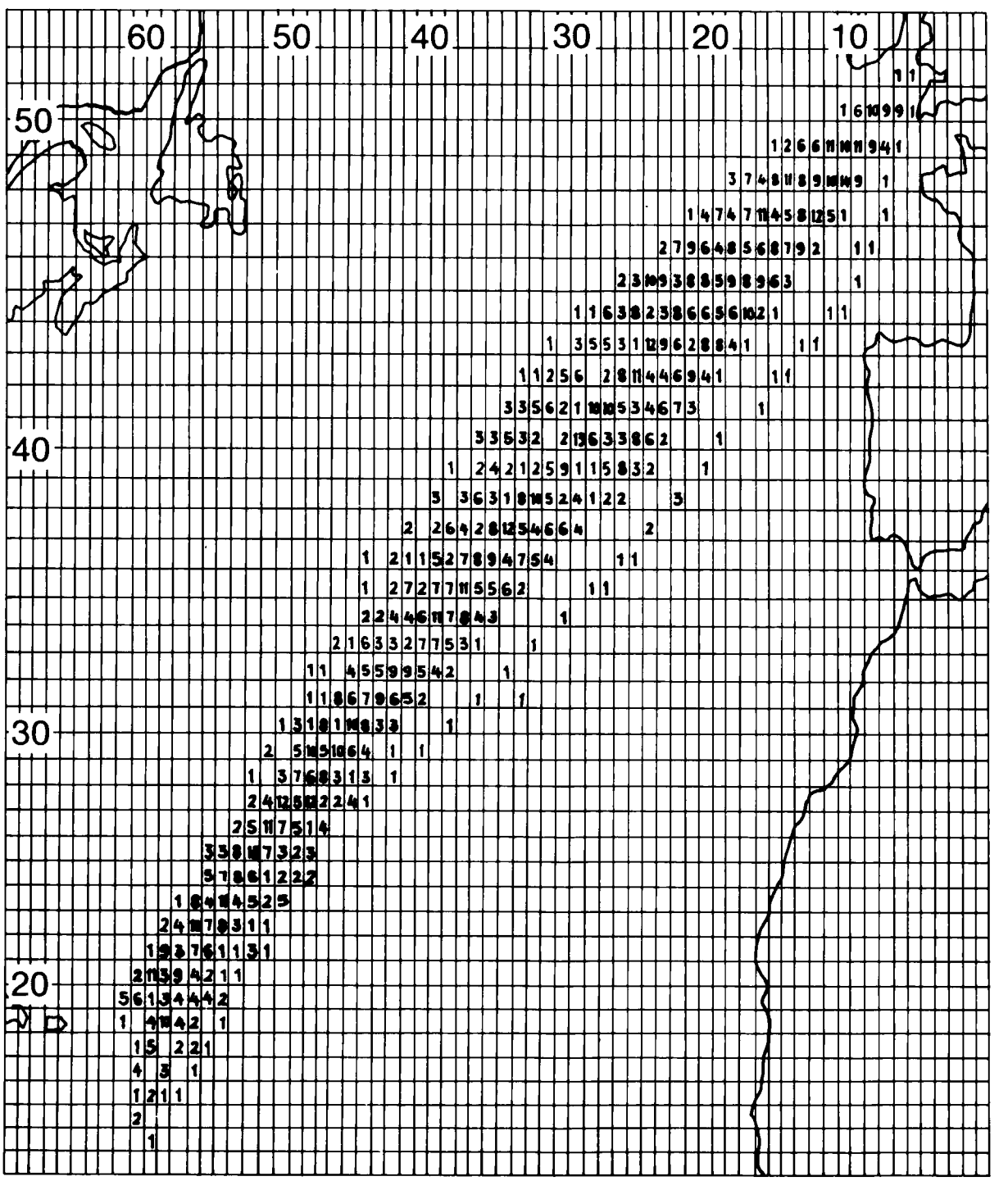


Figure 1. Observation counts in each 1-degree square provided by *Geestcape*/GJMR during the period of VSOP–NA.

Results of analysis

The variables studied are those which are important for the calculation of fluxes of sensible and latent heat between the ocean and atmosphere, and therefore likely to be of greatest interest in climate studies, i.e. dry-bulb and dew-point temperatures, sea-surface temperature, wind speed and direction and surface pressure. For each of these variables, mean differences from model values were calculated and displayed by ship. (See example in Figure 2, analysis of dry-bulb temperatures). It is clear from this type of analysis that significant

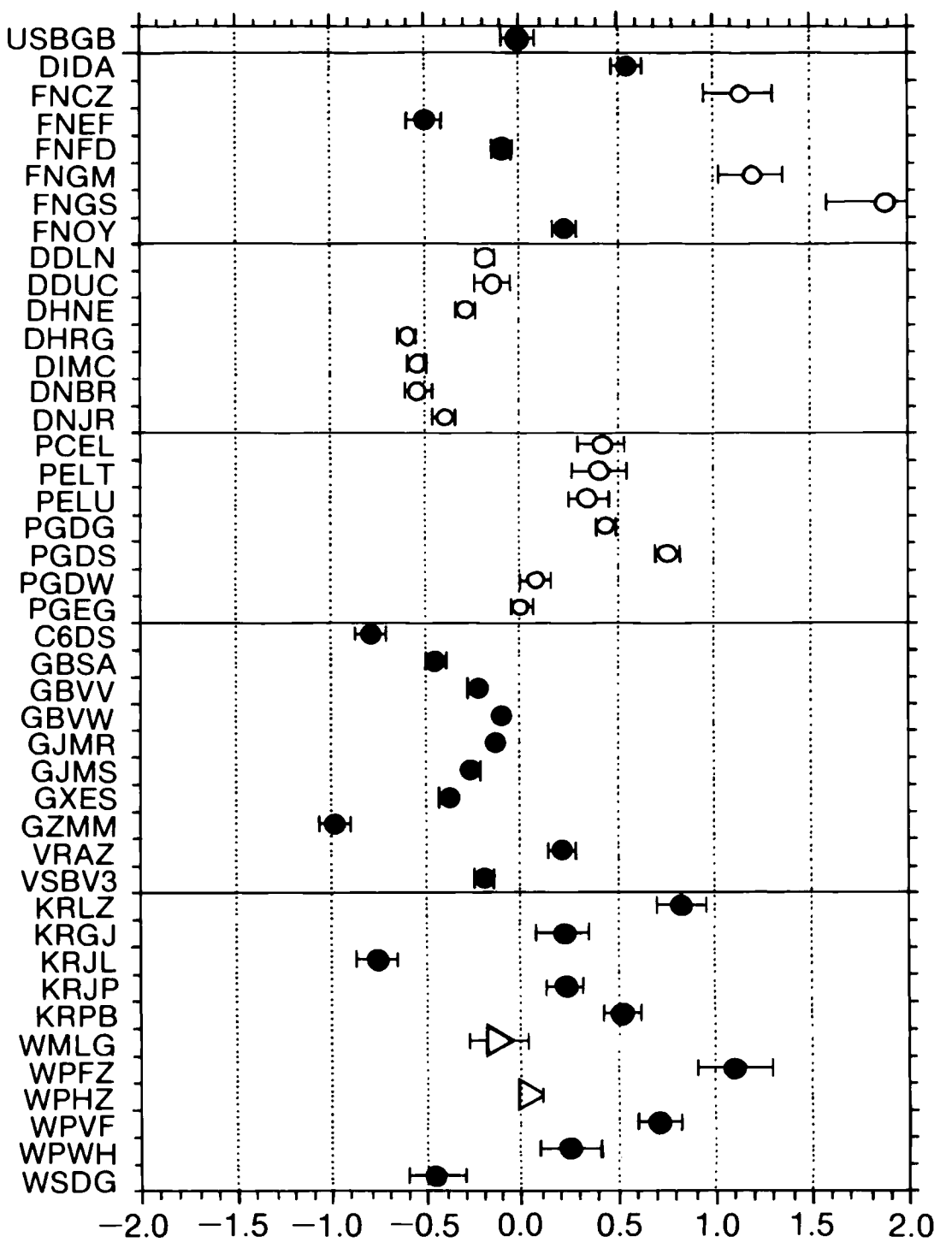


Figure 2. Mean air temperature difference from model by vessel and method of observation. Horizontal bars denote standard error about the mean difference.

KEY: ● Screen ○ Psychrometer ▷ Unknown

differences exist both between and within national groupings; there is a tendency for psychrometer readings to be slightly higher than those from well-exposed screens, but poorly-exposed sensors (both screens and psychrometers) give significantly higher temperatures, with greater scatter around the model values.

Detailed analysis will be reported elsewhere, but the main conclusions relating to observational methods can be summarised as follows:

(i) Dry-bulb temperature. Psychrometers and well-exposed screens give similar results, although Dutch psychrometers seem to be about 0.75 °C high. Many U.S.A. screens were poorly exposed, giving large biases and scatter. Solar radiation errors can be up to +1.5 °C.

(ii) Dew-point temperature. Psychrometers more likely to give accurate values. Screens can give values up to 1 °C higher than psychrometers, especially under high humidity conditions. Screens on U.K. ships show least scatter.

(iii) Sea-surface temperature. Hull sensor gives best results, with bucket similar in unstable airstreams. Bucket up to 0.5 °C high in stable and/or sunny conditions. Engine intake has high bias and greater scatter about model values.

(iv) Wind. Visual estimates too low for winds above 15 knots at night, but directions good. Fixed anemometers give speeds about 2.5 knots greater than visual estimates and directions may have constant bias; many errors found in conversion from relative to true wind. Hand-held anemometers have large scatter on speeds above 15 knots and on direction.

(v) Pressure. Digital precision aneroid barometers have smaller bias and scatter than analogue instruments. Most ships applied correction for height of barometer, but a few did not modify this correction to allow for changes in draft.

Conclusion of the project

The Management Committee for VSOP met at the Met. Office College near Reading in June 1991 to review the above findings and to make further recommendations regarding practices and procedures. These were directed to the National Meteorological Services operating voluntary observing ships, to WMO, and to the research community concerned with global climate issues.

The committee considered that the results of VSOP were likely to prove of significant and lasting benefit to National Meteorological Services and to climate research. The success of the project was attributable to the efforts of a large number of people, especially the Masters and ships' companies.

Acknowledgements

Thanks are due to Julian Starkey and Bruce Truscott of the Met. Office, who were responsible for the archiving of the VSOP data sets, and to Dr Peter Taylor and Elizabeth Kent of the James Rennell Centre for Ocean Circulation, who undertook the data analysis.

Above and below: Manatee photographed by the officers of m.v. *Lincolnshire*.
(See page 9.)

599.5(44)

Stranding of cetaceans*

By R. Duguy and D. Wisdorff

During 1988 311 cetaceans stranded on the Atlantic coasts of France. A monthly distribution showed a maximum in March. There was a clear correlation with gales prevailing over the preceding days, over the open sea or on the coast. These are the principal aspects of a study conducted by Raymond Duguy of the National Centre for the Study of Marine Mammals (CNEMM), Oceanographic Museum, in collaboration with Didier Wisdorff of the Central Department of Meteorology, both at La Rochelle, France. The study was first made the subject of an article appearing in the review *Oceanologica acta*, Vol. 11, No. 3, and of a second article in 1989 in the *Annals of the Society for Natural Science of Charente Maritime*. It is from these two very interesting texts that the following article was compiled.

Background

Since Antiquity the discovery of a stranded cetacean on the seashore has always aroused a feeling of astonishment, but also of curiosity to know the causes. In reality, from such events are understood the very different circumstances surrounding the stranding of a group ('mass stranding') or of isolated animals. These may arrive on the shore alive or be found already dead after drifting in the sea.

Since 1972 the research programme undertaken by CNEMM has had as its principal objective the census of all cetaceans and seals observed on the coasts of France. We have arranged the data for a 15-year period in such a way that we can understand the frequency of the different species, and to specify their spatio-temporal distribution.

As far as it concerns the observations of stranded cetaceans, it is important to take account of the progressive establishment of our information network, especially of the official assistance provided by constabularies and town halls after the issue in 1978 of the first interministerial circular concerning the strandings. It resulted in the finding that the number of observations did not have comparative values from one year to another, except for the last five years (1982 to 1986 inclusive) for which we estimate that we have been given the information in more than 90 per cent of the cases.

From the Loire to the Gironde

The geographic area chosen for this study extends from the estuary of the Loire to the Gironde, more precisely from Croisic Point to Coubre lighthouse. This coastal sector has the advantage of being the most representative of the cetology fauna of the north-east Atlantic. The largest number of species are found on the coasts of Charente Maritime. In second position comes the neighbouring province of Vendée, Loire Atlantique.

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* Translation of an article published in French in *Met Mar*, journal of maritime meteorology edited by Météo-France.

Between 1972 and 1986 inclusive, 263 strandings of cetaceans were recorded for the Loire and the Gironde. The Common Dolphin (*Delphinus delphis*), of the north-east Atlantic, constitutes 64 per cent of the individuals whose species were identified.

The continuous line in Figure 1 represents the monthly distribution of stranded cetaceans. The maximum frequency of stranding occurs at the end of

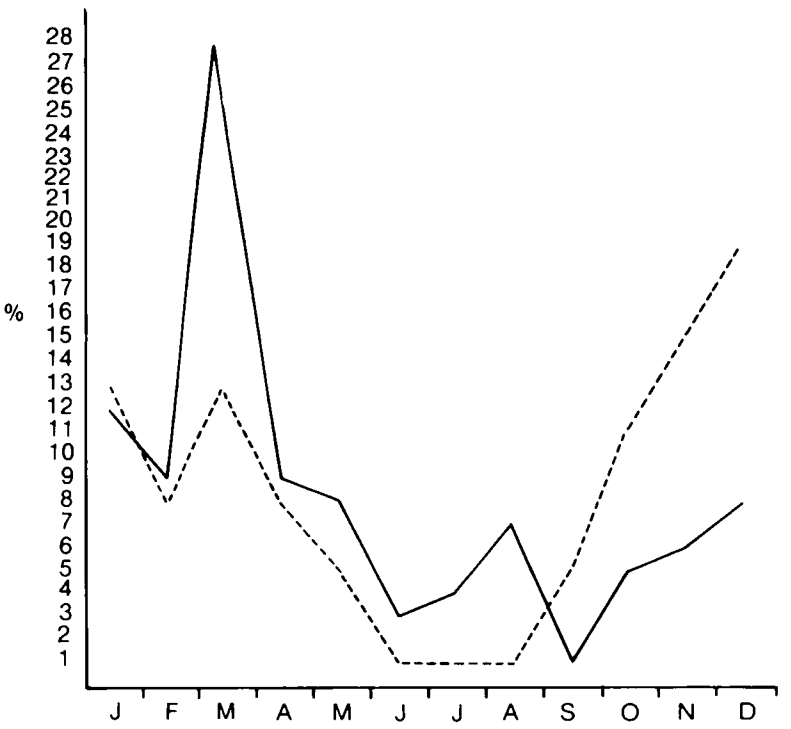


Figure 1. Comparison of strandings and periods of strong winds, expressed in monthly percentages for the years 1972 to 1986.

KEY: ——— Monthly percentage of strandings for a total of 263 observations.

-------- Monthly percentage of the sequence of two consecutive days or more, or mean wind greater than 8 m/s and the day's maximum gust greater than 16 m/s. The wind speed is the average of measurements taken at La Coubre, Chassiron and l'Île d'Yeu. Total number of observations: 344.

March, whilst the quietest period is found at the end of September. It is worthy of note that the first three months of the year are those during which the observations are the most numerous, viz. 49. During the other months, the distribution is as follows:

April–May–June = 20%
July–August–September = 12%
October–November–December = 19%

We have shown that the smallest number of dolphins which arrive on the point of death is found in March (5.35 per cent), yet this is also the month of maximum frequency of stranding; during the summer months (July, August, September) the proportion of individuals found dying is the highest (50 per cent, 83.3 per cent and 50 per cent respectively).

Correlation between stranding and gales

In Figure 1, the dotted line represents the monthly distribution of the occurrence of strong winds during the same period, 1972–1986. The criteria which served to enumerate the strong winds are shown in the section 'Meteorological aspects'.

The comparison between the monthly values (expressed in annual percentages) of the strandings and the occurrence of strong winds, shows that the variations are consistent up to the beginning of summer. One can see, in particular, the fall clearly shown by the two curves for the month of February, which seems to indicate a constant annual meteorological phenomenon. The contrast with the month of March is important, where the maximum annual incidence of strandings is found. However, the amplitude of this peak is due, in part, to an exceptional number of strandings in the period to the end of March 1986. The progressive reduction in the number of strandings from April to June has been similarly verified for *Delphinus delphis* by Fraser (1974) who suggests, in the same way as Collet (1981), a seawards migration of the dolphins for breeding. But one could equally say that the reduction in the number of strandings corresponds to that of the strong winds.

The increased percentage of animals found in the month of July, and above all in August, corresponds to a period of light breezes, which eliminates the influence of a meteorological factor in this period. It is therefore safe to assume that the cetaceans, almost entirely dolphin species, then find themselves in the neighbourhood of the coasts, either because of a feeding pattern, or because of their deficient state, the combination of both these factors not being incompatible.

The month of September presents the peculiarity of being clearly the smallest in the year, in percentage of strandings, whereas that of strong winds again begins to increase. The hypothesis of a period of transition can be envisaged; after a summer mortality, well marked in August, eliminating the defective animals, a period of remission could occur at this time, with gales again few in number, and favourable ecological factors and the sea temperature in September being comparable to that of June (Drapeau, Duguy, 1985).

During the last quarter of the year, the number of strandings progressively increases, but in a lesser proportion to that of the strong winds. If one concedes the influence of this last factor, one can advance the hypothesis of a lower natural mortality from October to December than from January to March. In other words, this proves the gales in the first quarter are accompanied by a much higher number of strandings of dolphins. The [physical] state of the animals shows, on the other hand, that the great majority amongst them die out at sea; the smallest percentage of living animals is found in March. The gales would have the effect of causing the deaths, but it is equally possible that they cause the *coup de grace* on already defective cetaceans, particularly as it concerns their respiratory systems. The autopsies which we carried out often revealed to us the existence of various respiratory deficiencies (lung tissue growths, broncho-pneumonia, parasites) which probably constitute the principal factors of mortality (Duguy, Toussaint, 1977).

Some animals died several days before stranding

The five years 1982 to 1986 inclusive have been taken as the reference period of more accuracy applicable to our research, for the possible relationship between

Photo by Raymond Duguy

Natural death or asphyxiation in the course of the storm of an animal already sick? Here a Common Dolphin is shown.

gales and strandings. In comparing the dates of these, there generally appears to be a delay of several days. The most significant example is that of the storm of 24 March 1986, with the strongest winds (38 m/s, 76 knots), and similarly the longest period of them (8 days) recorded since 1982. During the period 44 strandings of dolphin species were observed up to 31 March; the great majority of the animals arrived on the coast in a sufficiently advanced state, between 28 and 31 March. Estimating the wind drift at a speed of one knot, with a probable direction of west to east, it is supposed that the zone where the animals met their deaths is situated at about 100 n.mile off the coast, let us say quite close to the edge of the continental shelf. In the case of successive gales, separated by a sufficiently short period, it is probable that some of the animals found decaying were connected with the gale preceding the one during which they stranded. Concerning various whale species, it seems that the delay time from the report of the gales is of the order of 6 to 15 days, which can be explained by the distance to the coast from the areas of deep water which they habitually frequent.

Meteorological aspects of the study

For this exercise it was necessary to establish a criterion for strong wind. The first idea was to utilise the observations of ships on passage in the areas north and south of Gascony. Figure 2 shows the monthly frequency of winds of Beaufort force 7 (14 m/s) or more over the two areas for the period 1960 to 1980. Unfortunately the ships' observations being concentrated on the normal shipping routes, they are less frequent near to the coasts concerned. Furthermore, the number of observations is very variable from day to day and the same applies to the groups received.

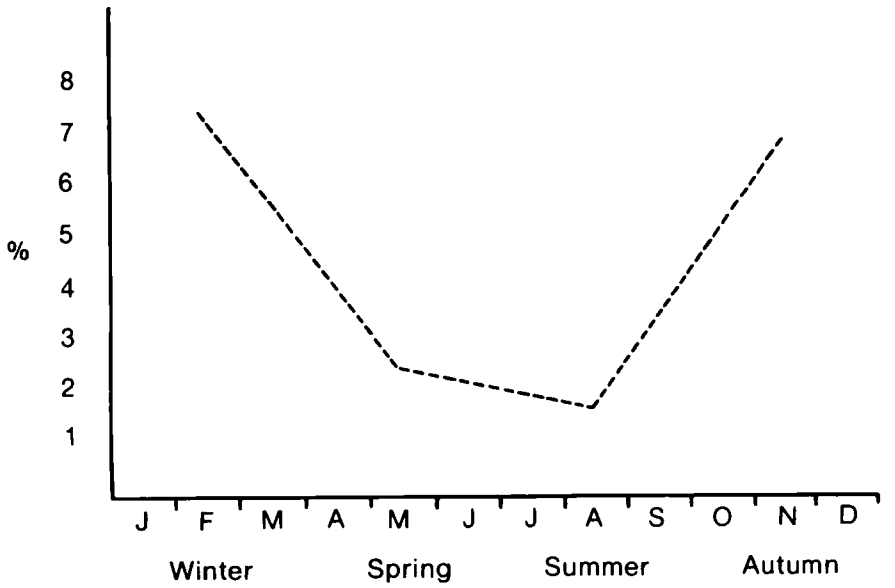
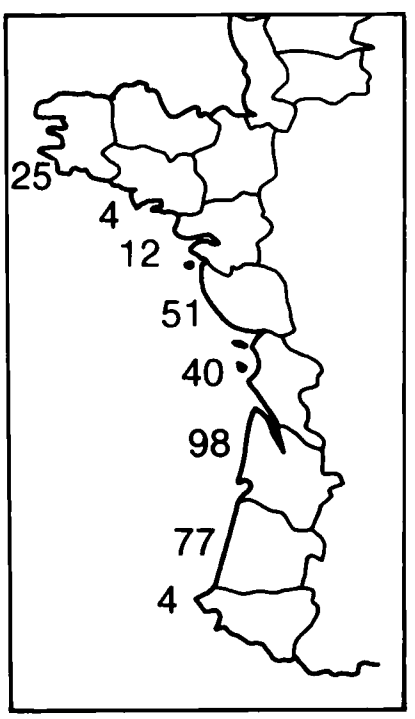


Figure 2. Mean percentage as a function of the month, of the number of observations of wind of which the speed is equal to or greater than Beaufort force 7. Zones: north and south Gascony. Period: 1972 to 1986.



1988: an exceptional year.
Distribution by Department of stranded cetaceans during 1988, along the Atlantic coasts of France.

The total number is 311 of which 274 were during the first four months of the year, with a monthly maximum in February.

There were in fact two significant episodes: the first in February on the coast of Gironde and des Landes. The proportion of males reached 82.8 per cent. The second episode took place in March/April on the Vendée coast. The proportion of males to females was 1:1. Such a variation could be interpreted as an indication of the composition of the groups: at the end of winter, certain amongst them would be composed of males, whereas in Spring this sexual segregation would not still exist.

By contrast, the abstracts made on shore (coastal meteorological stations, lighthouses or coastguards) have the advantage of being made continuously and of being more reliable. The four sites in existence on the coasts of our area of study were, from north to south: Saint-Nazaire, l'île d'Yeu, Chassiron (île d'Oléron) and La Coubre (Gironde Estuary). It is apparent to us that the winds were less strong at Saint-Nazaire, a site too far inland and therefore eliminated. The winds are a little stronger at l'île d'Yeu, because of the position of its anemometer at a height of 50 metres. At Chassiron and at La Coubre, the

observations are homogeneous although the directive effect of the Gironde river may be more sensitive on the latter site. To allow for these slight anomalies, we have chosen to calculate a mean value of the data collected from the three remaining stations.

The criterion used to determine the threshold at which the wind was suspected to have an effect on the strandings is empiric. From experience, it seemed to us that the wind force was not the only cause, but wind duration lacked sufficient evidence to indicate it would cause a significant difference in the number of strandings. We have therefore adopted the following criteria, taking into account the frequency of the mean force, of the maximum force and the duration: mean wind over 8 m/s (i.e. 16 knots or Beaufort force 5) and maximum gust over 16 m/s (32 knots) during at least two consecutive days. The data are those for the period 1972 to 1986 inclusive. In Figure 1 is traced the monthly distribution of the occurrence of strong winds selected in accordance with the above criteria.

It is interesting to note the relative minimum in February, which is absolutely non-existent on the curve of Figure 2.

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Photo by Yves Sabourin

Which seafarer on deck is never inclined to watch the games of cetaceans? *Globicephala* photographed from the Ocean Weather Ship *France 1* at 47°N, 17°W [former Ocean Station 'Romeo']. (See page 30.)

Photo. by Captain A.M. Walsh

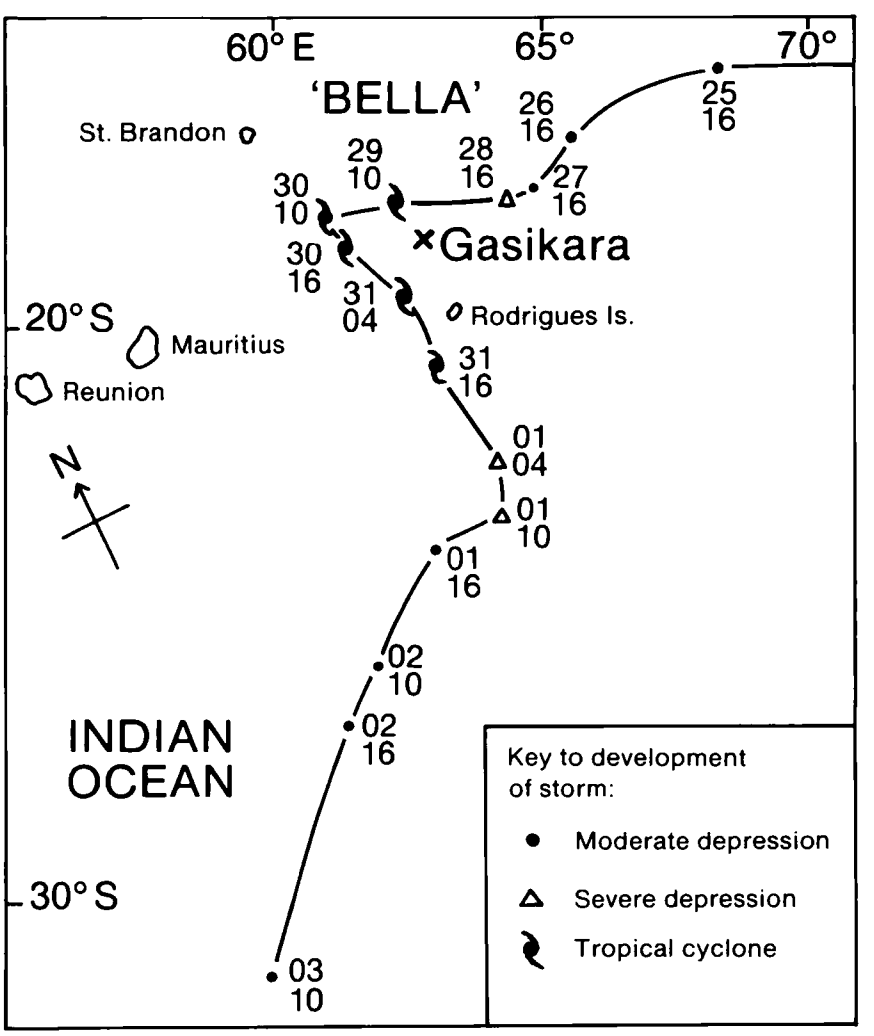
Seasmoke pictured from m.v. *Strider Isis* on 12 February 1991, in position 37° 03'N, 74° 29'W.

Indian Ocean cyclone 'Bella'

By Edley Michaud*

The south-west Indian Ocean tropical cyclone season ended a little late, in mid-June 1991, because in general it begins the previous mid-October and ends on or about 15 May.

Only Madagascar Island and Rodrigues Island were struck by the storms this season: Mauritius and Reunion Island were spared. Unfortunately, one ship was lost during intense cyclone 'Bella' which struck Rodrigues in January. The ship was the *Gasikara*, a general cargo ship of 12,609 tons gross, built at La Ciotat in 1975 and registered in Tamatave, Madagascar. Bound from Bangkok towards Reunion with a bulk cargo of rice, *Gasikara*'s last radio contact with the Harbour Radio at Port Louis, Mauritius, was on 30 January when she was about 275 km east-north-east of the island. (See chart). Communications with the Mauritius Met. Service had not been good, but after that time nothing further was heard. It



was assumed that the ship was caught in the intense stage of the storm and was lost with all 36 crew in the early hours of 30 January in position 19.5° S, 62.2° E, north-north-west of Rodrigues. No SOS messages were picked up by other ships or nearby islands. An aircraft search in the area of her last known position gave

* Edley Michaud is an amateur meteorologist collaborating with the Mauritius Met. Service.

no positive results but three days after she went missing a lifeboat from the ship was seen drifting due south of Rodrigues. Four weeks later debris from the ship was found on the western coast of Mauritius.

Port Louis Harbour Radio gave warnings of gale force winds from 26 January onwards until the final disintegration of the cyclone in early February. At Rodrigues the lowest pressure recorded during the passage of Bella was 961 mb at 0130 on 31 January and the highest wind speed of 132 mph was recorded at the same time. Pressure readings from the mercury barometer loaned to me by the U.K. Met. Office Marine Branch in November 1990 and transmitted to the Mauritius Met. Service at six-hourly intervals helped them to track cyclone Bella.

SPECIAL LONG-SERVICE AWARDS

Four shipmasters who each submitted a meteorological logbook in 1990 and having 18 or more observing years to their credit have been nominated by the Chief Executive to receive long-service barographs for their dedication to weather work, as follows:

CAPTAIN M. EDWARD, P&O Ferries Limited.
CAPTAIN A.J. FEE, P&O Containers Limited.
CAPTAIN P.A.E. SAMBROOK, P&O Containers Limited.
CAPTAIN C.R. SHORT, P&O Containers Limited.

We offer our congratulations to the recipients, who, although all with the same group company now, came through by various routes, ending at the top of the list for this year.

Captain Edward sent us his first log from Alfred Holt's *Maron* in October 1962: he has contributed a total of 42 logs in 22 years of observing, with 21 Excellent markings to his credit, obtaining Excellent Awards in 1979, 1981, 1985 and 1990.

Captain Fee started life at sea with Shell Tankers, from whose *San Fortunato* he sent his first log in September 1963. This was followed by 50 more logs in his 22 observing years, and he earned 30 Excellent markings. He has received Excellent Awards on eight occasions.

Captain Sambrook unfortunately passed away at the age of 52 in January 1991, following a short illness whilst he was in command of *Tor Bay*. However, his widow has agreed to accept his barograph when the presentation ceremony takes place later this year. Captain Sambrook sent us his first log from Glen Line's *Glenorchy* in July 1961 and carried out observing to the end, with a total of

49 logs in his 21 observing years. Twenty-eight of his logs were marked Excellent and he received Excellent Awards in 1988 and 1989. An obituary notice appears elsewhere in this issue.

Captain Short sent in the first of his 49 logs from P&O–Orient Lines passenger ship *Orion* in November 1962. He received Excellent Awards in seven years, showing a total of 29 logs with an Excellent marking.

Perpetuating a tradition inaugurated in 1948 by the Met. Office Director of the day, the four recipients will be invited to Bracknell to receive the long-service awards later this year.

AURORA NOTES JANUARY TO MARCH 1991

By R.J. Livesey

(Director of the Aurora Section of the British Astronomical Association)

In Table 1 are listed the observations of the aurora received from mariners to date, any further records will be added to the national archive on arrival and included in the annual analysis of auroral activity.

Table 1 — Marine Aurora Observations January to March 1991

Date	Ship	Geographic Position	Time (GMT)	Forms in Sequence
12/13 Jan.	*Sulisker*	57° 00'N, 02° 24'W	0430–0543	G.RR.
8/9 Feb.	*Westra*	59° 00'N, 03° 30'W	2350	G.HA
11/12	*St Clair*	57° 48'N, 01° 35'W	2010–2220	p_2RR.p_2RR.G.G.
11/12	*Canmar Europe*	48° 13'N, 60° 46'W	0200	RB
5/6 Mar.	*Selectivity*	56° 25'N, 01° 00'W	2125–2145	G.RR.G
6/7	*Selectivity*	58° 40'N, 04° 30'W	2000–2330	RA.RB.HBR_2. P.HB.Pp.G.HB
6/7	*Cumulus*	57° 29'N, 20° 32'W	0045	HB
24/25	*Esso Fife*	55° 00'N, 00° 22'W	2134–2143	RA.G.RR
24/25	*Elk*	55° 02'N, 00° 05'E	0055–0113	RB.RB.RR, all colours
24/25	*Telnes*	52° 21'N, 03° 50'E	0100–0120	RA
24/25	*Sulisker*	59° 55'N, 02° 36'W	0300–0310	CRR, all-sky
25/26	*St Clair*	58° 30'N, 01° 24'W	0000–0200	RR.RR
25/26	*Cumulus*	57° 53'N, 20° 08'W	0245–0336	apHB.aRV.map$_2$R$_3$R. fpR.R.QHN.aRR. Rapid flashes
25/26	*Sulisker*	59° 41'N, 03° 53'W	0400–0450	RB.pRR
26/27	*British Spirit*	35° 07'N, 115° 48'E	1324–1406	G, red+purple
30/31	*Cumulus*	58° 57'N, 19° 17'W	2130	QHN

KEY: a = active, f = fragmentary, m = multiple, p = pulsating, p_1 = flaming, p_2 = flickering, A = arc, B = band, C = corona, G = glow, HA = homogeneous arc, HB = homogeneous band, N = unspecified form, P = patch, Q = quiet, R = ray, RA = rayed arc, RB = rayed band, RR = rays, R_2 = medium rays, R_3 = long rays, V = veil.

After the higher level of auroral and geomagnetic activity in the early part of 1990 it fell in the later part of the year and continued thus into January 1991 when there were low levels comprising glows and unspecified forms seen from northern Scotland especially on the 11th, 12th and 15th. A small magnetic storm on 1 February brought with it some rayed structures in the higher latitudes with repetitions on the 8th, 11th, 13th and 20th. The magnetic field was particularly quiet from 19–22 January and from 16–18 February which equalled the solar rotation period of 27 days between the two periods. From 4 March the field became much more disturbed when the aurora was seen down to Wales on the 5th and 6th, and was active in northern Scotland on the 19th, culminating in a severe magnetic storm covering 24–26 March.

The major auroral storm of the period took place between the 23rd and 26th. As the Earth rotated under the northern and southern auroral ovals aurora was progressively visible in America, New Zealand, Europe, America and so on. In Figure 1 is shown the extent of the visible aurora in British waters for the night of 24/25 March when it was overhead in southern Scotland and visible from the English Channel. Measurements of the tops of rays made by English observers suggested that these were of the order of 400 km above the Solway Firth. The rapid flashing reported by O.W.S. *Cumulus* is a feature commonly seen from the auroral zone but we have records that it is sometimes observed in mid-latitude aurorae under very active conditions.

The whole aurora of 24/25 March had periods of alternate activity and quiet. For example, all British observers agree that between about 2130 and 2145 UTC there was a sudden evolution of intense activity. In northern Scotland it was described as a waterfall of colour and at Cambridge as an awe-inspiring display. This sudden onset of intense aurora coincided with a sudden weakening of the horizontal component of the Earth's magnetic field. The field strength recovered by 2200 and the aurora subsided accordingly. The magnetic trace showed that there were two storms, the first beginning suddenly at about 0330 on the morning of the 24th and as the disturbance subsided a second storm burst in the evening.

On the night of 13/14 February, Dr Alastair Simmons observed a short-lived aurora that made its appearance in the skies to the south of Glasgow at 2000 and 2017. No other observer saw this aurora, and there was no magnetic activity other than a slight 'blip' on two local magnetometers which, in the ordinary way would have been put down to local disturbance or instrumental error. Dr Simmons holds a gold medal of the British Astronomical Association for his work in the observation of the polar aurora, so his observing credentials are impeccable. This event, taken in conjunction with another well authenticated event observed by Todd Lohvinenko at Winnipeg on 13/14 June 1987, lasting only a few seconds, led to the investigation of the 'flash aurora'. From time to time we have received from mariners and other observers isolated reports of short-lived unconfirmed mid-latitude aurorae occurring when the magnetic field was relatively quiet. In the past these have had to be considered as possibly doubtful or misidentified events. There was one occasion for example, when three observers reported aurora when the event turned out to be laser beams being shone into the sky during social events.

Investigations indicate that flash aurorae take place frequently in the auroral zone without there being a marked magnetic disturbance. The mid-latitude event must be a much rarer occurrence and highly dependent upon there being a suitable observer looking at the sky at the right place and time to be able to record

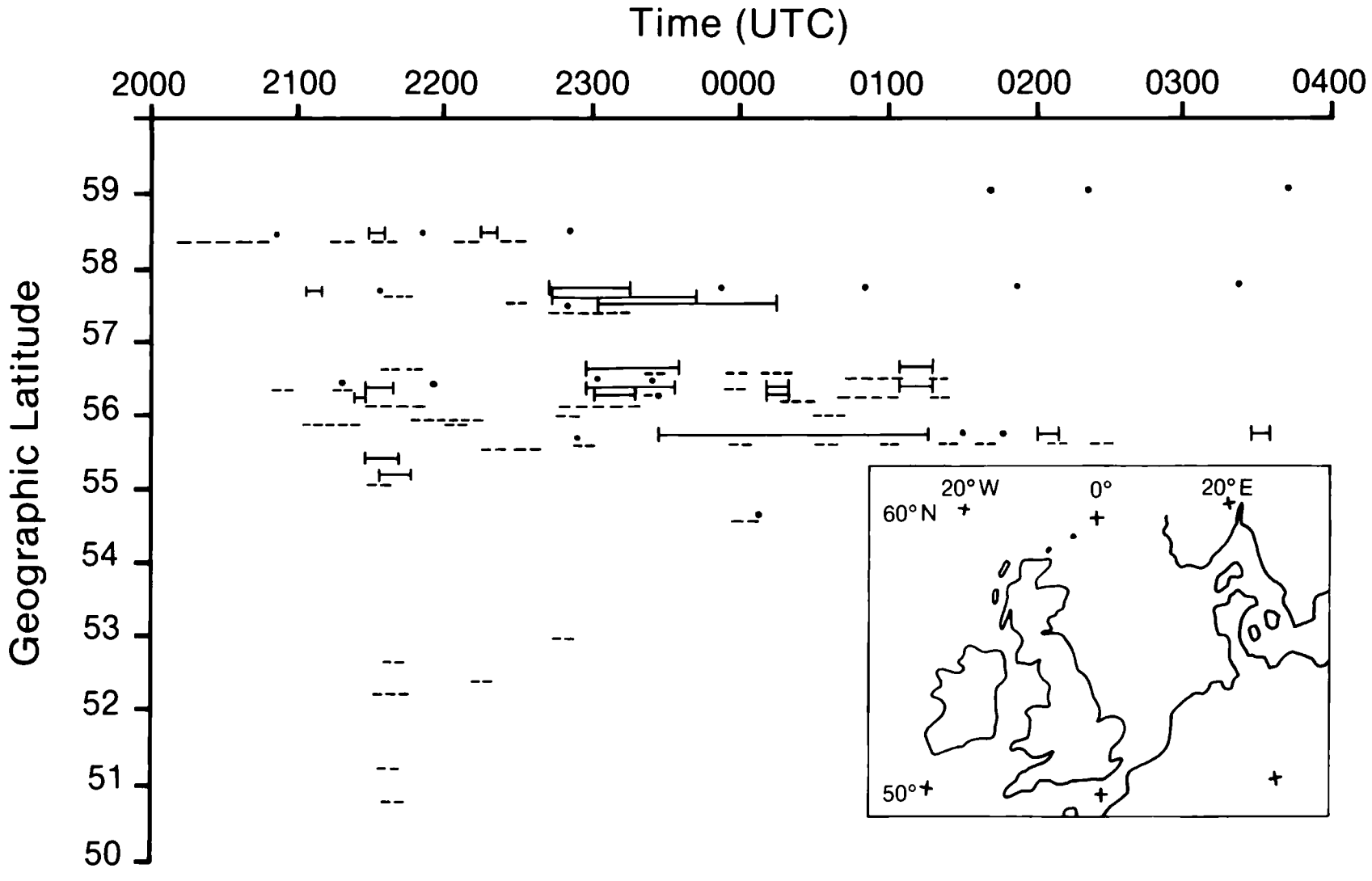


Figure 1. Auroral storm of 24/25 March 1991 — U.K. waters.

KEY: • and ⊢⊣ Corona present; --- Aurora visible

the event. There is no ready explanation for the flash aurorae; the Earth's magnetic field, the atmosphere and the ionosphere together with the various zones of ionised particles within the magnetic system all act together as a large electrical dynamo as the Earth spins on its axis. One possibility is that small short circuits and instabilities take place and inject electrified particles into the atmosphere to cause the flash aurora.

Please record everything you see; remember that Galileo recorded sunspots that, in accordance with the theory of the time, ought not not to have been there.

LETTERS TO THE EDITOR

(Letters to the Editor, and books for review, should be sent to the Editor, *The Marine Observer*, Meteorological Office, Eastern Road, Bracknell, Berkshire RG12 2PW, U.K.)

This letter is in reference to the routeing charts published by the Admiralty. At times we find that the information provided, though invaluable, is contrary to our experience, especially in the case of ocean currents.

Now that most of the ships are provided with Satellite Navigators, I feel we mariners are in a better position to provide more accurate information on ocean currents. A general request to all ships for their old satnav printouts if a printer is provided, or the abstract of satnav logs of ships without the printer, can provide enough data to enable the Admiralty to publish more accurate charts.

I understand that an accurate speed log is essential for the data to be of any use. Nevertheless, I feel the data from ships without speed log can be of some use especially from less frequented areas like the southern latitudes. This letter is written on the assumption that the Admiralty does not have other means of tracking the ocean currents, viz. satellite tracking of free drifting ODAS buoys. Data from ODAS buoys are certainly more reliable than data from ships.

Captain T.T. Kavalil, Master, m.t. *Edmo*, Barber Ship Management (U.K.) Ltd.

Our thanks to Captain Kavalil for his original ideas for logging currents. The information on currents published in Admiralty routeing charts and Pilots is based on consolidated information compiled in the Met. Office from observing ships' current records entered in meteorological logbooks. One of the problems for ships is the accuracy of position from Satnav, which is itself dependent on a knowledge of ship's course and speed. Thus a printout from a vessel without speed log is likely to be of relatively little value, both DR and fix being suspect.

The Hydrographic Office points out that currents are far more varied than an examination of some current diagrams and charts might lead one to suppose, as Captain Kavalil has experienced himself. This is why they are tending to place current roses in the Sailing Direction these days. These at least give an idea of the constancy to be expected. It is important to consider the variability of the currents and the effect of recent prevailing weather conditions on the currents. Copies of the correspondence exchanged on this subject have been passed to Captain Kavalil.

Personalities

(Readers are invited to notify the Editor of observing officers retiring from the Navigating and Radio Departments.)

OBITUARY — CAPTAIN P.A.E. SAMBROOK died in Singapore on 9 January 1991, following a short illness which occurred when he was in command of m.v. *Tor Bay*.

'Sam' Sambrook was born on 5 June 1939 at Wallasey, Cheshire, and remained living in Merseyside, at Upton, Wirral, for the rest of his days. He began his sea career by joining Alfred Holt & Company as Midshipman in August 1956. He remained with the Ocean Transport and Trading group until May 1983, and meanwhile we received his first meteorological logbook in July 1961 from *Glenorchy*. This was to be the first of 49 logs he contributed over 21 observing years, and 28 of these logs received Excellent marking. He also received two Excellent Awards.

Captain Sambrook obtained his Master's Certificate in March 1967 and in 1983 transferred to P&O Containers Ltd. His first command was *Discovery Bay* to which he was appointed as Master in April 1988.

As announced under 'Special Long-Service Awards' in this issue, Captain Sambrook has been posthumously awarded a long-service barograph for his excellent meteorological work up to the end of 1990. Whilst offering our sincere condolences to his widow, two daughters and family, on their great loss, we are pleased that Mrs Jeanette Sambrook has willingly accepted our invitation to receive her husband's barograph when the formal presentation ceremony takes place later this year.

RETIREMENT — CAPTAIN C.B. WALGATE retired from P&O Containers on 1 April 1991.

Callis Bruce Walgate was born in March 1933 and educated at Morrison's Academy, Crieff, Perthshire. He undertook three months of pre-sea training at the Glasgow School of Navigation before joining the British Tanker Company (BP) and being appointed to his first ship *British Captain* on 25 November 1949.

After obtaining his Second Mates Certificate in 1954 he was employed by Cayzer Irvine & Co. and joined their *Clan Shaw* on 22 March of that year. He sent an 'Excellent' meteorological log to the Met. Office only three months later, this being the first of 35 he helped to compile. Of these, 14 logs were marked 'Excellent' and he received Excellent Awards in 1983, 1984 and 1985.

Captain Walgate obtained his Master's Certificate in 1960 and remained with British and Commonwealth, as it later became, until 1978 when he joined Overseas Containers Ltd. He took command of the *Moreton Bay* in the same year and remained with P&O Containers until his retirement, his last ship being *Kowloon Bay*.

Captain Walgate said that in many respects he thoroughly enjoyed his career at sea, but he was now looking forward to being in command of nothing larger than a lawnmower. Our thanks to him for his long period of co-operation and good wishes for a long and successful retirement.

RETIREMENT — MR G. MCDANIELSON was compelled to take early retirement from the sea owing to sickness, after serving for 27 years as a Marconi Radio Officer.

Gary McDanielson was born in November 1945 and educated at Sowerby Bridge Grammar School, West Yorkshire. He attended the College of International Marine Radiotelegraphic Communications, Brook's Bar, Manchester, from September 1962 to February 1964, resulting in the issue of his P.M.G. 1st Class Certificate. Other Certificates gained were the Advanced Marine Electronics Diploma in December 1967 and Radar Maintenance in September 1973.

In April 1964 he joined A.E.I., who were subsequently taken over by Marconi in July 1965, and appointed as 2nd Radio Officer to m.v. *Clan Macdougall.* Following a training voyage he joined *Mobil Acme* in December 1964, beginning a long and happy association with Mobil Shipping Co. Ltd, which lasted until October 1986 on *Mobil Marketeer.* It was in August of that year that we received the first of 32 meteorological logbooks, five of them marked 'Excellent', bearing Mr McDanielson's name, and he received an Excellent Award for 1990, showing dedication to the sending of 'Obs', resulting in perfect transmission records in a met. log for that year.

He served on many Mobil vessels in the interim period, notably 7½ years continuous North Sea service on the *Matco Avon* from 1976 to 1983. After leaving Mobil he spent a few months on ferries, concluding his sea career with 2½ years aboard P & O Ferrymasters m.v. *Elk*, running between Teesport and Gothenburg, all these vessels being Marconi manned.

Gary McDanielson officially retired, medically unfit through Parkinson's Disease, on 31 January 1991, but not unduly troubled by his illness at present, and we therefore wish him further success and happiness in retirement.

We are pleased to have a review of a Radio Officer's career once again, as such advice from that department is all too rare in these times. Company Personnel Officers and Radio Officers please note and keep up us in touch when they near retirement.

Notices to Marine Observers

INTRODUCTION OF THE GMDSS EGC SAFETYNET SYSTEM

With the official introduction on 1 February 1992 of the International SafetyNET Enhanced Group Call service of the Global Maritime Distress and Safety System, IHO NAVAREAS will be used for the broadcast of forecasts and warnings. The United Kingdom will broadcast such warnings from Goonhilly via the Atlantic Ocean Region (West) satellite for NAVAREA I, at 0930 and 2130 UTC. Parts V and VI (selection of sea and land station reports) will be broadcast at 1130 UTC. This area for Maritime Safety Information purposes is the North Atlantic Ocean east of 35° W, from 48° 27'N to 71°N, including the North Sea and Baltic Sea sub-area. The present Atlantic Weather Bulletins for Shipping will continue to be broadcast unchanged until the full implementation of the GMDSS in 1999, when they will become obsolete.

MARINE BRANCH — CHANGE OF ADDRESS

In early December 1991, the Marine Branch of the Met. Office was due to move to new modern offices in the Sterling Centre, further along Bracknell's Eastern Road. Our address remains substantially the same:

Meteorological Office
Observations (Marine)
Scott Building
Eastern Road
Bracknell
Berks RG12 2PW

There is no change to the direct telephone numbers or to the telex number. The facsimile number is changed to 0344 855921.

The Marine Advisory and Consultancy Service was also due to move to the Johnson Building in London Road, Bracknell, at the end of October. Changed address and telephone numbers to be advised.

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Fleet Lists

GREAT BRITAIN

Updated information regarding the list published in the July 1991 edition of *The Marine Observer*. Amendments for this list are required by 30 September. Information for the main listing in July is required by 31 March.

Name of Vessel	Date of Recruitment	Master	Observing Officers	Senior Radio Officer	Owner/Manager
Ambra Hunter	17.5.91				Wallem Shipmanagement Ltd
Ambra Stresa	6.8.91	P.A. Yorke	C.A. Mayling, K.G. O'Sousa,	A.G. Lobo	Wallem Shipmanagement Ltd
Avelona Star	11.6.91				Blue Star Ship Management Ltd
BP Argosy	20.5.91	P. Darlow	T.T. Latto, T. Ashby, J. Lewandowski	R. Ball	BP Shipping Ltd
Baltic Breeze	19.4.91	Wui Tan	I.C. Oke, Min Kyi Lay, Htun Ngwe	Kan Nyunt	Mann Motorships Ltd
CMB Monarch	29.5.91	A. Pereira	D. Singh, B.P. Parikh, V.M. Nayak	R. Dandona	Canpac Maritime Ltd
CMB Tabora	15.3.91	A.C. Matthews	R. Rajeopal, G. Prashant, E. Gonsalves	D. Kulkarni	Canpac Maritime Ltd
Cottica	28.6.91	J. Chalmers	O. Power, J. Hughes, A. Fonseca	A. Fernandez	Wallem Shipmanagement (I.O.M.) Ltd
Crane Arrow	23.8.91	C.H. Knight	N. Vidad, S. Bavtista, A. Barangvita	D. Bacal	Matheson Shipping Services Ltd
Dawn Blazer	1.8.91	J. Holmes	D. Cook	—	Boston Putford Ltd
Eastern Bridge	11.6.91	C.R. Bamford	M. Dvornik, R. Davic, B. Middleton	K. Woodley	Ropner Shipping Services Ltd
Gull Arrow	8.7.91	R.I. Bennett	G.P. Dalinda, M.R. Estrado, J.S. Pepino	D.J. Duggan	Matheson Shipping Ltd
Jahre President	24.8.91	S. Singh	J.W. Mampilly, P. Rishi, E. Rivera	R.A. D'Souza	Wallem Shipmanagement Ltd
Jahre Spirit	14.8.91	D.V. Dutt	S. Rai, N. Amaria, S. Das	B. Sharifabadi	Wallem Shipmanagement Ltd
James Clark Ross	22.8.91	N.A. Beer	R. Jackson, G. Hobbs, J. Burgan	S.J. Mee	National Environment Research Council
Kathe Sif	31.7.91	B.H. Nielsen	P.L. Lassen, P. Madson	—	Knud I. Larsen
Kelvin Challenge	18.4.91	J.W. Wilcock	A.M. Lairn, G.C. Frias, C.B. Estavillo	E.M. Diao	Acomarit (U.K.) Ltd

Mobil Swift	22.8.91	I.D. Coppack	R.R. Tolete, M.D. Jones, E.E. Empeno, D.D. Salazar, P.A. Guilles	R.P. Cobo	Mobil Shipping Co. Ltd
National Generation	13.6.91	D. McLean	D. Bell, B. Sutcliffe	—	James Fisher & Sons plc
Ocean Surveyor	10.6.91	W. Allen	R.P. Willis, J. Downing, D. Knights	M. Scanlon	Cable & Wireless Marine
Seniority	24.4.91	L. Pink	R. McNab, P. Branigan	—	F.T. Everard & Sons Ltd
Star Pembroke	4.6.91	G. Hartshorne	M.R. Bailey, P. Hughes, V. Golding, D. Ireland	W. Bradshaw	Texaco Overseas Tankships Ltd
Stena Britannica	24.7.91	W.G. King	D. Coombs, R. May	T. Plant	Stena Sealink (U.K.) Ltd
Trident Epic	9.3.91	S.Y. Shah	A.W. Khan, I. Umar, S. Guyum	A.H. Khan	Atlas Ship Management Ltd
Ville de Canopus	12.6.91	G. Lierman	J. Vereecken, P. Tilliere, J. Vantomme	M. Vlasic	CMB Belgium
Ville de Sirius	30.4.91	I. Bernimolin	G. Vandercappellen, P. Malfait, O. De Nutte, F. De Stoop	P. Van Damme	Antwerp Technical Services
Western Bridge	13.3.91	M. Bradley	A. Kocjancic, V.C. Kovic, L.P. Bridges	I. Wilson	Ropner Shipping Services Ltd
Zetland	13.3.91	L.J. Hesketh	S. Ahmedi, R. Subramaniam, R. Fitton	F.R. Patel	P&O Ship Management Ltd

The following Selected Ships have been deleted:

BP Humber, Canadian Explorer, Contship Spain, Direct Kea, Direct Kookaburra, Eastella, Hill Cove, Indiana 1, John Biscoe, Kagoro, Kingsnorth Fisher, Leicesterbook, Luminetta, Mamora, Monas Queen, Monmouth, OOCL Dynasty, Ortelius, Reefer Manggis, Reefer Nangka, Safco Endeavour, Singapore Senator, Sky Clipper, Stainless Spray, Tor Scandinavia, Trinity Explorer, Venassa, Vic Bilh.

BRITISH COMMONWEALTH

NEW ZEALAND (Information dated 1.8.91)

The following Selected Ships have been recruited since the list published in the July 1991 edition of this journal:

Tangaroa, Union Rotoma.

The following ships have been deleted:

Aotea, James Cook, New Zealand Mariner, Union Endeavour.

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